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THE PROPOSED GOVERNMENT FRUIT, VEGETABLES AND PRODUCTS DEPÔT.

In our January issue we strongly advocated the establishment of an Agricultural Loan Bank as a means of encouraging our farmers to extend their cultivation of fruit and vegetables, and so overcome the existing shortage of these commodities. Assuming that this is primarily an agricultural colony, it is a grave reflection that we are to a large extent dependent upon our neighbours for fruit and ground provisions; but it must be taken into consideration that our farmers have been greatly hampered and discouraged in the past by circumstances over which they had no control, such as droughts and floods, and in smaller measure, by attacks of plant pests and diseases. However, even with improved drainage, and the assistance given by the Department of Science and Agriculture in the teaching of modern methods of cultivation, the distribution of plants and seeds, and the control of pests and diseases, the fact remains that our farmers have been severely handicapped by lack of knowledge of marketing their produce, and hence in not receiving the full money value for their crops. We have ascertained that potatoes can be landed here more cheaply by schooners trading between Barbados and British Guiana than they can be produced and sold in the Georgetown Municipal Markets when grown by the local farmers. This being the case, it is evident that both transport diffi-

culties and the absence of any organization linking up the small farmer with the consumer, are acting detrimentally against the farmer's interests. It is a fact which cannot be gainsaid, that such crops as plantains, ground provisions, kitchen garden produce, etc., pass through various hands before finally reaching the consumer, with the result that the latter has to pay the middleman's profit, the farmer does not benefit, and the middleman ekes out a parasitical existence at the expense of all concerned. Again it is well known that farmers have to suffer much inconvenience before they can dispose of their crops; some have to travel great distances with their produce with the object of selling it with advantage. In many instances this is not achieved, and the farmer returns home, out of pocket, and considerably disheartened.

The proposed establishment of a Fruit, Vegetable and Products Depôt in Georgetown is a step in the right direction, and when started, farmers and others should do their utmost to make it a success. There is no reason why such an agency should clash with the legitimate commission agent. Indeed, the Government Depôt, it is hoped, will act as a stimulus to greater production and a larger volume of trade, which, in time, may lead to certain products being found on our export list, which at present are conspicuous by their absence. The main idea is to supply a ready and perfectly reliable market for the small farmer and to link up the Georgetown consumer with the grower. Much fruit goes to waste in our country districts —oranges, pineapples, bananas and such like crops. As Mr. Charles Shankland states, *small trial shipments of these* and other products might yield really valuable information as to "the quality of the goods shipped transport arrangements, packing, demand, selling values, markets etc." Any such information gained could be handed over to agents, who, by private enterprise, might create a valuable export trade. The Depôt can also do good work in the distribution of useful pamphlets, thus assisting in the education of the farmer. Seeds and economic plants might also be sold to them with advantage.

Elsewhere we publish a letter from a correspondent proposing the establishment of "Boys' and Girls' Clubs" in the Colony. This appears to us a matter for the managers of the primary schools to deal with, but the success of these clubs in other parts of the world should be, in itself, a recommendation for their trial here. The Depôt should be the legitimate medium for the disposal of the products from these clubs, which would derive all the benefits we have mentioned as likely to accrue to the farmers who partronize it.

PREVENTION OF MOULD IN RUBBER.

Experiments conducted by the Scientific Officers of the Rubber Growers Association have shown that paranitrophenol is very effective as a mould preventive in sheet rubber, and has no deleterious action on the rubber. Recommendation for its use are given in the *Bull Rubber Growers' Association.* (1925, 7, 560). Paranitrophenol may be applied either by soaking freshly rolled sheet in the solution or it may be dissolved in the acid used for coagulation. For crepe rubber, the latter method is more suitable.

The material is not readily soluble in water, and plenty of time must be allowed for it to dissolve. After standing, the clear liquor is poured off and care must be taken to prevent any undissolved particles getting into the latex, as dark-coloured specks will result. For this reason the soaking process is safer to use. A 0.1 per cent. solution (approximately 3¼ oz. to 20 gallons of water) is recommended for soaking, the rubber being immersed in it for half an hour (*loc. cit.*, 1926, 8, 10); soaking for three hours, the period originally adopted, is not necessary. In the coagulating process 1½ oz. of paranitrophenol are dissolved in 10 gallons of water to which 5 oz. of acetic acid have been added, and the mixture is used to coagulate 30 gallons of latex standardised at 1¾ lb. per gallon dry rubber content. The material must not be dissolved in the water used for diluting the latex.

MEETING OF THE BOARD OF AGRICULTURE

A Meeting of the Board of Agriculture was held in the Court of Policy Hall Public Buildings on Wednesday, the 26th May, 1926, at 2.30 p.m. The following were present:—W. Francis Esq., F. I. C., (Acting Director of Science and Agriculture), Chairman; S. H. Bayley, Esq.; L. D. Cleare, Jr. Esq., F.E.S. (Government Economic Biologist); Dr. C. L. Whittles, B.A., Superintendent, British Guiana Sugar Planters Experiment Stations; G. E. Anderson, Esq., representative, Royal Agricultural and Commercial Society; The Hon. J. J. Da Silva, E. M. Walcott, Esq., F.R., H. L. Humphrys, Esq., Thomas Earle, Esq., Captain E. Beckett, F.L.S., H. A. Britton, Esq., President, The British Guiana Farmers' Conference; Dr. F. Wills, C. R. Williams, Esq., with E. M. Peterkin, Esq., Secretary.

The Chairman reported the receipt of a letter from the Private Secretary, stating that His Excellency the Governor did not propose to preside at the meeting.

The minutes of the previous meeting held on the 26th. of February, 1926, having been circulated to the members of the Board and having received their approval, were on the motion of Mr. S. H. Bayley, seconded by Mr. H. L. Humphrys, taken as read and confirmed.

The death of Mr. A. S. Milne, M. R. C. V. S., late Government Veterinary Surgeon, on the 11th. March, 1926, was reported. Mr. H. A. Britton moved, seconded by Dr. F. Wills, that the Board's regret at the death of Mr. Milne be recorded, and that the Secretary be instructed to write a letter of condolence to his widow. This was carried unanimously.

The Chairman reported:—

The resumption of duty by Mr. Thomas Earle on the 22nd. of April.

Leave of absence granted to Mr. W. M. B. Shields.

Appointment of Mr. W. Mearns as a Co-optative member of the Veterinary Committee.

The Chairman reported the affiliation of the following Associations :—

The Mahaicony Farmers' Association.
The No. 1 Canal Farming Association.
The Stanleytown Agricultural Society.
The No. 2 Canal Polder Farming Association.
The County of Essequibo Agricultural Association.

Mr. Britton opposed the affiliation of the Mahaicony Farmers' Association on the ground that the Association had not complied with Section 9 of the Regulations governing the affiliation of District Agricultural and Farming Associations, which provided that applications for affiliation must be made through the Secretary of the British Guiana Farmers' Conference.

After some discussion it was proposed by the Hon. J. J. Da Silva, seconded by Mr. Beckett, that the application be returned to the Association with instructions that it be sent through the proper channel.

A further outbreak of Anthrax at Pln. Providence, East Bank, Demerara, on the 20th. April, 1926, was reported. The Chairman informed the Board that the outbreak had been stamped out in a very short time and the quarantine subsequently lifted. Mr. Britton said he thought that as the animals had died after having been inoculated, the owners thereof should be compensated.

The Chairman reported that the Government had informed him that the Executive Committee had advised that in view of the present financial position and the absence of a permanent Government Veterinary Surgeon, the proposal of the Board as to the importation of certain Live Stock during 1926, for which an excess of $2,245 on the vote was required, be allowed to stand over.

The Chairman reported that the Veterinary Committee at their meeting held on the 25th. March, 1926, had decided that it was not desirable that Section 36 of Ordinance 5 of 1920 should be amended, but that they should impress upon the Director of Science and Agriculture the importance and necesssity of exercising great caution, as to what persons were authorised to inoculate and brand animals during an outbreak of Anthrax.

The Chairman reported that the Agricultural Exhibitions Committee had decided on Mr. Britton's motions, forwarded to them, as under :—

Motion.—That the time is opportune for practical steps to be taken for Grading of Local Products for Exportation.

Decision.—That the object was very desirable but that the present was not an opportune moment for enbarking thereon.

Motion.—That a committee be appointed to inquire into the necessity, and report upon the advisability, of the establishment of a government aided Vegetable Products Factory.

Decision.—That the present financial condition of the Colony precluded any such step being taken.

The following were laid on the table for general information :—

Memorandum by Mr. Francis on the report of the Joint Committees of the Sugar Planters' Association, the Chamber of Commerce, and the British Guiana Farmers Conference, on an Export Fruit Industry. On the motion of Mr. Britton, seconded by Mr. G. E. Anderson, it was decided that this report should be circulated to the members.

Reply from Lady Harrison to the letter of condolence from the Board.

Reply from Mrs. Gainfort to the letter of condolence from the Board.

Letter of thanks from R. Ward, Esq., M. B. E., *re* his appointment as an Honorary member of the Board of Agriculture.

Census of Agricultural Industries for 1925.

Journal, Board of Agriculture, Volume XIX No. 2.

Return of acreages under Sugar Cane, and yields, for 1925.

Annual Departmental Report for 1925.

Annual Meteorological Report for 1925.

The Board discussed the question of Live Stock to be imported during 1926.

The Chairman explained that the amount on the Annual Estimates was $1,200.

Mr. S. H. Bayley proposed, seconded by Mr. H. A. Britton that an amount not exceeding $400 be expended on poultry, and that the expenditure of the remainder be left to the Live Stock Committee. This was unanimously carried.

The advisability of holding Agricultural Shows this year, on account of the effects of the prolonged drought was next considered.

The Chairman mentioned that the Secretary of the Berbice Association had written asking that the County Show for Berbice, which was fixed for September, 1926, be held in March, 1927.

Mr. Britton said that the next year was the year for the County Show for Demerara.

Mr. Bayley thought that as a result of the drought, there would be nothing to exhibit, and suggested that they might save the money.

Mr. Walcott suggested that what might be done to meet the altered position, would be for the Board to decide that the Berbice and the other two County Shows be postponed for twelve months. Berbice could have theirs in 1927, and Demerara in 1928.

Messrs. Beckett, Da Silva, Britton and Dr. Wills were in favour of holding Shows this year.

It was eventually decided that this be left to the Agricultural Exhibitions Committee to decide.

The following questions and motions by Mr. H. A. Britton, President, British Guiana Farmers' Conference, were dealt with :—

Question 1 :—Whether or not the Board will recommend to Government the necessity for the introduction of a Bill for the Inspection of Local Produce intended for exportation along the lines of the Dominica Exportation of Fruit Or,dinance, 1926 ?

Question 2 :—What industries not affected by drought and flood will the Department of Science and Agriculture recommend, for the inhabitants of the Colony to embark upon ?

Question :—3 :—Whether or not the Department of Science and Agriculture has carried out; if not, will it carry out experiments with a view of ascertaining the best variety required for the production of Black Tobacco?

After some discussion Mr. Britton decided to leave these over.

Question 4 :—Whether or not a copy of the report on the Canje District by the then Government Botanist, Mr. A. W. Bartlett, who was accompanied by Mr. King, is available; if so, I ask that it be laid on the table prior to publication in the Journal of the Board?

Answer :—The Secretary replied that up to the present, he had been unable to find same.

Question 5 :—Has the report of the Committee with respect to the establishment of Agricultural Stations for the trial cultivations of Bananas, Citrus Fruits and other Economic Products suitable for exportation and approved by this Board been forwarded to the Government; if so, what practical steps have been taken by the Acting Director of Science and Agriculture for the establishment of the first station?

Answer :—Yes, it has been submitted to Government.

Question 6 :—What steps, if any, have been taken to get Government to place at the Disposal of the Director of Science and Agriculture a sum of money, to be used by the Director in consultation with the Director of Co-operative Credit Banks, to assist small farmers to again make a start after the drought?

Answer :—The Chairman informed him that this was a subject with which the Drought Committee were dealing

Motion 1 :—That regular quarterly meetings of the Board of Agriculture be held on the third Tuesday in the months of January, April, July and October.

The Chairman explained that at a General Meeting held on the 3rd. February, 1925, the President, Sir Graeme Thomson fixed the months of January, May and September for general meetings to be held, and that it was not practicable to fix any definite day in each month.

Mr. Britton withdrew his motion.

Motion 2 :—That steps be taken for the establishment of a Stock Farm within easy reach of Georgetown.

The Chairman informed them that this was under consideration, but it was agreed that he should appoint a Committee to deal with and report on it.

The Chairman suggested that a date be fixed for the inspection of the Botanic Gardens, but the members suggested that he fix a date and notify them of same.

On the motion of the Chairman seconded by Mr. E. M. Walcott, the under-noted Order under Section 23 of the Improvement of Breed and Prevention of Contagious Diseases (Animals) Ordinance, 1920, was unanimously confirmed :—

DATE OF ORDER.	AREA DECLARED	DISEASE.
21st. April, 1926.	At Plu. Providence, East Bank, Demerara, bounded on the North by the side-line opposite Head Overseer's house, on the South by No. 3 Canal, on the East by the Public Road, and on the West by the Demerara River.	Anthrax.

On the motion of the Chairman seconded by Mr. E. M. Walcott, the above-noted Order under Section 23 of the Improvement of breed and Prevention of Contagious Diseases (Animals) Ordinance, 1920, was then unanimously revoked.

The Chairman then adjourned the meeting to a date in September to be fixed later.

Agricultural Census Returns.

COMPARATIVE SUMMARY.

Areas Under	*BRITISH ACRES.*			
	1922	1923	1924	1925
Sugar-cane (under cultivation)	60,761	55,130	57,200	57,500
Sugar-cane (reaped) ...	56,545	50,510	51,355	55,676
Rice (under cultivation) ...	49,070	34,965	29,406	29,333
Rice (reaped)...	60,460	38,715	40,272	39,890
Coconuts ...	26,600	22,970	25,188	29,979
Cacao ...	1,370	1,903	1,900	1,918
Coffee ...	4,240	4,096	5,685	6,243
Rubber ...	2,330	2,080	1,655	2,200
Limes ...	660	800	710	655
Provision Crops	11,370	11,924	14,443	11,715
	CROPS.			
Sugar, tons ...	101,128	90,758	91,782	107,580
Rice, bags of 140 lbs. ...	545,360	532,400	673,610	614,451
Coconuts, Thousands * ...	22,352	15,923	12,303	17,617
British Guiana.	*LIVE STOCK.*			
Horses ...	1,710	1,610	1,796	1,776
Asses	6,170	5,450	6,176	7,673
Mules ...	1,750	1,840	2,300	2,245
Horned Cattle	111,900	102,170	113,315	134,629
Buffaloes ...	190	264	175	282
Sheep ...	16,980	15,355	16,185	24,399
Goats... ...	8,300	7,965	9,792	13,650
Swine ...	12,310	11,864	12,889	15,560

THE PRINCIPAL VARIETIES OF SUGAR CANE IN BRITISH GUIANA UNDER CULTIVATION DURING 1924, 1925, 1926.

By the Director of Science and Agriculture and the Secretary of the British Guiana Sugar Planters Experiment Stations Committee.

AREAS IN BRITISH ACRES.

Variety.	1924. acres.	1925. acres.	1926. acres.	Increase or Decrease on 1925.	
				Increase.	Decrease.
D. 625.	37,108	37,413	39,193	1,780	
Bourbon.	391	323	362	39	
D. 625 mixed with Bourbon & other seedlings.	7,126	9,201	8,300		901
D. 145.	3,496	2,649	2,854	205	
D. 118.	1,656	1,576	1,891	315	
R. P. 8.	498	461	285		176
B.H. 10 (12)	295	190	226	36	
B. 208.	625	403	204		199
Diamond 37.	363	316	154		162
P.L. 2.	79	103	139	36	
D. 109.	125	127	116		11
D. 419.	102	84	70		14
Ba 6032.	138	89	56		33
D. 179.	52	46	46		
D. 167.	37	51	37		14
Diamond 10.		5	34	29	
Diamond 581.	85	55	29		26
G. Transparent.	38	29	16		13
Small areas under other varieties & areas under varieties unenumerated.	504	269	88		181
Total Estates' Canes.	52,718	53,390	54,100	710	
Total Farmers' Canes.	2,412	3,800*	3,400*		
Totals.	55,130	57,190	57,500		

* Areas at Plns. Anna Regina & Hope transferred to Farmers' Canes.

The following table indicates the relative distribution of the various kinds of cane during the crops of 1921, to 1926 inclusive.

Variety.	For Crops of					
	1921.	1922.	1923.	1924.	1925.	1926.
D. 625.	56·5	59·4	65·4	70·4	70.1	72.5
Bourbon	3·5	2·5	2·7	0·7	0·6	0.6
D. 625 mixed with Bourbon and other Seedlings.	13·9	15·2	11.5	13·5	17·2	15.5
D. 145.	7.5	7·3	7·1	6·6	4·9	5.2
D. 118.	4.8	4·1	3·6	3·1	2·9	3.5
Providence 8.	1·6	1·3	1.5	1·0	0·9	0.5
B. 208.	3·4	3·0	2.0	1.2	0·8	0.4
Diamond 37.	0·2	0.3	0·6	0·7	0·6	0.3
B.H. 10 (12)	0·2	0.3	0·4	0·6	0·3	0.4
D. 109.	0·5	0·5	0·3	0·2	0.2	—
Diamond 185.	1·3	1·0	0·9	0·3	—	—
Ba 6032.	0·3	0.4	0·5	0·3	—	—
D. 419.	2·7	1·6	1·1	0·2	—	—
Other Varieties unenumerated.	3·6	3·1	2·4	1·2	1·5	1.1
	100.0	100·0	100·0	100·0	100.0	100.0

From the returns supplied by the Sugar Plantations, the distribution of the various sugar canes in cultivation for the crops of 1921 to 1926 inclusive, according to their origin is as follows:—

Variety.	1921	1922	1923	1924	1925	1926
Bourbon and other old Varieties.	8·8	8·2	9·2	4·8	5·1	5.0
Java.	1·1	0·4	0·1	0·1	0·1	—
Barbados.	4·4	4·1	3·2	2·2	1·4	1 0
British Guiana :—						
Plns. Diamond & Providence.	3·3	3·5	3·7	2·6	2·2	1.2
Botanic Gardens.	82.4	83·8	83·8	90·3	91·2	92.8
	100·0	100·0	100·0	100·0	100·0	100.0

The average yields in tons of commercial sugar per acre of the principal varieties under cultivation for the crops of 1925, as deduced from the returns supplied by the Managers of the Sugar Plantations, were as follows:—

Crops of 1925.

	B. H. 10 (12).		D 118.		D. 419.	
	Yields.	Acreage.	Yields.	Acreage.	Yields.	Acreage.
Mean of all plantations	2·63	192	2·55	1,086	2·49	109
Maximum reported ...	3·06	53	3·11	89	3·90	21
Minimum reported ...	2·02	65	1·96	94	1·46	49

	D 145.		<> 37.		D 109.	
	Yields.	Acreage.	Yields.	Acreage.	Yields.	Acreage.
Mean of all plantations	2·38	2,342	2·34	282	2·25	86
Maximum reported ...	2·80	5	2·42	263	3·40	40
Minimum reported ...	1·94	24	2·27	19	1·44	8

	Bourbon.		D 625.		Ba. 6032.	
	Yields.	Acreage.	Yields.	Acreage.	Yields.	Acreage.
Mean of all plantations	2·25	43	2·22	27,971	2·12	1 20
Maximum reported ...	2·68	6	2·98	2,824	5·18	4
Minimum reported ...	1·71	7	0·70	208	1·10	19

	Mixed.		B 208.		Green Transparent.	
	Yields.	Acreage.	Yields.	Acreage.	Yields.	Acreage.
Mean of all plantations	2·10	7,438	1·95	376	1·88	32
Maximum reportd ...	2·92	42	2·32	133	2·00	7
Minimum reported ...	0·70	352	1·57	215	1·76	25

Many of the smaller plantations, owing to the scant labour supply, were not in a position to keep up their cultivations as they otherwise would have done, as a result of which their crops were short. It is desirable to record separately the results supplied by the Managers of the larger and hence more favourably situated plantations. The results were as follows:—

	B H 10 (12)		D 118		D 419	
	Yields	Acreage	Yields	Acreage	Yields	Acreage
Mean, larger plantations only	2·65	168	2·65	1,056	2·49	109
Maximum reported	3·06	53	3.11	89	3·90	21
Minimum reported	2·02	65	1·96	94	1·46	49

	D 625		D 109		D 145	
	Yields	Acreage	Yields	Acreage	Yields	Acreage
Mean, larger plantations only	2.40	25,245	2·40	80	2·38	2,342
Maximum reported	2·98	2,824	3·40	40	2·80	5
Minimum reported	2·00	912	1.44	8	1.94	24

	Mixed.		<> 37		Bourbon.	
	Yields	Acreage	Yields	Acreage	Yields	Acreage
Mean, larger plantations only	2·38	4,231	2·34	282	2·25	43
Maximum reported	2·92	42	2·42	263	2·69	6
Minimum reported	1·90	43	2·27	19	1·71	7

The results of large scale field-trials with other varieties on the sugar plantations are shown in the following table :—

Varieties.	Acreage.	Yield.
D. 433.	7	2.92
D. 108.	16	2.89
R. P. 21.	18	2.85
D. 747	5	2.80
R. P. 8.	438	2.73
D. 167.	35	2.54
Diamond 185.	4	2.54
Diamond. 581.	51	2.42
R. P. 20.	27	2.40
D. 199.	23	2.33

RETIREMENT OF MR. R. WARD, M.B.E., SUPERINTENDENT OF BOTANIC GARDENS AND AGRICULTURAL STATIONS.

By Edgar Beckett.

With the retirement of Robert Ward, M.B.E., from the Service of this Colony, we have lost a Botanist whose severe modesty has, perhaps, caused many to lose sight of the great work he did for the Herbarium of this Colony.

Mr. Ward has been so long associated with the Botanic Gardens that one can hardly visualise him in any other connexion. Born in Perthshire, Scotland, on 23rd April, 1860, he served his apprenticeship in the Dunkeld Gardens, the property of the Dowager Duchess of Athol. When his journeymanship terminated, he entered the service of Dickson and Company, of Edinburgh, one of the principal Nurserymen in Scotland. He spent three strenuous years at Dickson's, where he learnt all the practical work of gardening, including the skilled arts of this profession.

He was still, however, determined to carry on his studies in Botany, and for this purpose, he entered the world-famed Gardens at Kew. Here he did excellent work, becoming the head of one of the Departments, and having under him, men who have since become famous in the Botanical World. He spent three and a half years at Kew, and early in 1886 came to British Guiana to take charge of the Nurseries a The Botanic Station.

When he arrived in this Colony no one knew anything about propagation work, potting of plants, pruning and general garden work, with the exception of Mr. Jenman and Mr. Waby. Together with that well-known Botanist, the late George Samuel Jenman, F.L.S., the then Government Botanist, Mr. Ward set to work, and it was not very long before he transformed the existing Nursery, ino something that the Colony could be proud of. It must be remembered that, at that time, he had to teach the practical work to everyone, since not one of the labourers knew anything at all of Nursery work. He was an expert at

grafting and potting, and the raising of every kind of seedling. He found some of the East Indians apt pupils, and turned out several very skilled men. His capacity for down right physical hard work, we make bold to assert, has never been equalled by any man in this Colony, not excluding the great Sugar-King, William Russell. Tireless himself, he was able, in some mysterious manner, to infuse energy into all the men under him. It was not long before his skill and ability gained recognition, and he was offered the post of Botanist in one of our West African Colonies. This he accepted, but when he saw how much his chief (Mr. Jenman) grieved at the idea of his leaving, with the great work they had started not completed, he afterwards declined the appointment. Not long after this he was seconded to carry on under Mr. Jenman and afterwards under Jenman and Professor Harrison, the important work of raising Seedling Sugar Canes—at which time he was paid by the Imperial Government. For this work, somewhere about 1901, he was specially thanked by His Majesty's then Secretary of State for the Colonies.

When the new Department of Science and Agriculture was formed, Mr. Ward was drafted into this and continued the work of raising Seedling Canes and assisting in the training of farmers and others, in practical Agriculture. Without Mr. Ward's help, we are very doubtful whether we should have seen these experiments carried to so successful an issue, as has been the case. If we are not mistaken, D 625 might have been thrown out as useless (as was its sister D 626), were it not for his foresight.

The amount of sheer, hard work he has put in, with respect to these experiments, is inconceivable! He was ever ready to put his Work first, and his Pay last. As long ago as 1888, Jenman writing about the work in the Herbarium in one of his annual Reports stated that, "the classification has been completed by Mr. Ward, working on holidays and in unofficial hours." We have known him, for reasons that seemed good to himself, remain in the fields, day after day, from 6.30 a.m. to 9 p.m., weighing canes by lamp-light, so as to push

on with work which was urgent. The extra pay for the men usually came from his own pocket. This may have been unwise, but it is characteristic of his whole life in the Colony. Utterly unselfish, devoted entirely to his work, and modest to a degree which bordered on being foolishly so, he was the most loyal of officers. His devotion to Jenman and Harrison had something in it that was almost pathetic. His aesthetic taste in flowers and his knowledge of tone-value in colours, was most remarkable. There has never been anyone in this colony who so thoroughly understood the culture of the grape. Again out of his own pocket, he imported and cultivated at the Experimental Station, a number of the most delicate varieties of grape, teaching the pruning of the vines to anyone who cared to learn. He grew most magnificent Black Hamburgs and other superior varieties, with splended success. Amongst his apt pupils was the late Mr. D. V. Jacobs, who, for a number of years, cultivated grapes quite successfully at Buxton, East Coast, Demerara.

To Sir John Harrison, Mr. Ward, was invaluable. On all Sir John's trips into the Interior, Mr. Ward accompanied him. He also made several trips into the Interior in the interest of our local flora. He added materially to the collection of the very fine Herbarium at the Botanic Gardens here, and to Herbaria in many parts of the world. It was he who obtained seed of the rare and interesting palm ***Hyospathe elegans***, at Eagle Mountain, Potaro. His knowledge of plant life was not confined to the practical side, though he will be remembered more especially in this connexion. He had, also, a sound scientific knowledge of Plant life—sounder than many suspected.

Mr. Ward took a very great interest in the Agricultural and Live Stock Shows held in this Colony, and only those who were associated with him know the amount of absolutely unselfish service he gave, to make every Show a success. It is of interest to note that, Mr. Ward, during all these active years of service, has had but one holiday of six months, most of which was spent in a Hospital in London, owing to a fracture of the arm, the result of a fall from his bicycle.

Mr. Ward will be assuredly a great loss to the Colony, but, nevertheless, the good work he has done has already borne fruit. He deserves all the happiness which a man in sound health and vigour should secure, after some forty years strenuous work in this Colony, in his honoured retirement from his duties. We trust that he will still favour the Board of Agriculture (of which he has been appointed an Honorary Member) with his advice from time to time.

Recognition to workers often comes slowly, and where the modesty of a man is a marked feature, it may be years before any appreciation is publicly expressed. It was not until quite recently that the distinction of Membership of The British Empire was conferred upon Mr. Ward.

To Mr. Ward, Work, with a very large capital, meant almost everything. Stern though he was in connexion with Work, his Charity, given to all, is well-known. Indeed his kindness of heart was only equalled by his greatness in having an honest purpose in Life. He recalls to us, that famous line in Horace's Odes : ***Justum et tenacem et propositi virum*** :

A LOCAL INDUSTRY.

By S. N. Bruce, M.V.D., Acting Government Veterinary Surgeon.

High Feeding Value Of Copraline.

Copraline is the only cattle feed (patented) containing the digestive virtues of the coconut kernel, coconut oil, and sugar cane, and is used with the very best results in British Guiana by the Government Farms, Botanic Garden Station, Sugar Estates, and leading cattle owners, where there is plenty of convincing evidence concerning the value of Copraline as a truly efficient feed for producing the greatest flow of milk, for prolonging the lactation period, and for keeping the animals in good condition.

GREAT VALUE TO *HORSES, MULES AND DONKEYS.*

It is interesting to know that it has been found of great value to horses, mules and donkeys. The Government Stud Farm, Mounted Police Horses, Municipal Stables, and most of the heavy draught animals do particularly well on this feed, especially is this the case of animals transporting lumber on the wood grants—perhaps the severest test of endurance for any animal.

Thousands of bags of Copraline are exported annually, and highest testimonials have been received from leading British Authorities and Agricultural Colleges.

This feed is highly concentrated, and it is well worth while to briefly describe its manufacture, and the ingredients from which it is prepared.

MANUFACTURE DESCRIBED.

The value of the first ingredient molasses as a food has long been recognised, but nevertheless, it cannot be regarded as a complete food in itself, but is an excellent substance to mix in greater or lesser quantities with other nutriment. It is free from the excessive saline matter which beet sugar molasses contains, and from the objectionable smell and flavour of the latter.

This molasses is brought down from the Sugar Estates in punts, being put up in strong barrels or hogsheads—which by the way, always have to be carefully coopered, as molasses has an unfortunate habit of fermenting—After being emptied out in the boiling pans, the molasses is thoroughly concentrated, a density of 48° Bé being sought, and is then ready for mixing, and in this form will help fatten stock enormously, by reason of the large amount of carbohydrates—SUGAR—which it contains, and the same cause leads it to be particularly suitable for use where *great muscular work* is required.

The next ingredient used megass, is the cellular portion of the sugar cane itself, formed of a number of minute cells, obtained from the coarse megass by disintegration and screening. A large portion of this substance is a digestible food in itself; it is likewise a powerful absorbent, and possess the property of imbibing four times its own weight of molasses. This fact, however, is not altogether surprising, when it is remembered that the cells of which this honey-combed ingredient is chiefly formed, *originally* held about eight times their weight of cane juice.

This fine megass usually contains somewhere around 25 per cent. of water and every care has to be exercised in drying. The apparatus—a very elaborate and expensive one—consists of a revolving drum fitted with a series of internal circumferential divisions placed within a large brick compartment, where hot air passes and heats the drum. As the latter revolves, the fine megass continuously falls in showers from the top to the bottom; and under the influence of this applied heat, gives up its contained moisture and is ready for mixing.

The *third*, and most important ingredient of Copraline, is obtained from the coconut in two forms :—

(1) The flesh after the kernels have been broken, desiccated through the mills, pressed and dried at a fixed temperature.

(2) The residue from the process of boiling the coconut oil—solidified oil—which is locally called 'chancy' or 'poonac.'

These two ingredients alone are rich in albuminoids and oil, and if fed to livestock give splendid results.

It can readily be imagined then, what a rich, well-balanced food is obtained, when all the above mentioned ingredients, are associated together in fixed proportion, and the whole compound passed through specially prepared mixing machines; further not only is this feed economical, rich in nutritive and force giving material, but its excellent flavour conduces largely to its appreciation by animals. This mixture is next removed to the cooling chamber, and after an expiration of 48 hours weighed and bagged.

IMPORTANCE OF CONDITION.

Emaciation in cattle, except that caused by recognizable disease, must be considered as due to inadequate or faulty nutrition.

It is a condition which develops when the destruction of body tissues takes place more rapidly than the processes of repair and growth, the nutritive reserves of the body becoming exhausted and the animal being obliged to utilize the muscle and other tissues in order to support life. Any loss of condition in a cow should be anticipated and extra food given. After a long course of milk-giving, cows are apt to fall off in condition. The fact is, cows should be kept in as good condition as possible, not only in the dry season, but all the year round.

Due to the prolonged drought, every description of cattle in the Colony is suffering from emaciation, and to quote the Chairman, of the VICTORIA—BELFIELD AGRICULTURE SOCIETY, at the last monthly meeting. "Farmers must bear in mind that if they want their stock to give proper satisfaction, they must be properly fed. I recommend Copraline, a feed I have used with beneficial results."

It would be as well to state here that SIR JOHN HARRISON C.M.G., M.A., F.I.C., F.G.S., ETC. late Director of Science and Agriculture and Chairman of the Board of Agriculture, carried out a series of experiments

with Copraline, at the Government Farm Onderneeming, the results being highly satisfactory.

REGULARITY IN FEEDING.

The hours of feeding cows are not of primary importance ; but it is of the greatest importance that the hours fixed upon should be rigidly adhered to, as cows suffer greatly from want of regularity in feeding as in milking. When kept tied up all day, they want feeding four times, at equal intervals of time. Those out all day should be fed morning and evening.

WATER SUPPLY.

Under whatever system dairy cattle may be fed and managed, it cannot be too strongly impressed the utter necessity of an abundant supply of pure fresh water. It is absolutely essential for them if they are to give a good yield of milk. Pure Spring water is the best, but very hard or chalky water is not good, nor well water unless very pure. Stagnant water, and water which is impregnated with sewage is naturally poisonous to the cows, the milk, and the milk consumer ; but it is to be feared care to avoid such water being used by cows is sometimes wanting.

Professor Daniels asserts that anyone can see that the yield of milk is directly proportionate to the quantity of water absorbed, which conclusion he has arrived at by comparing the quantity of water absorbed by various cows in yield. He asserts, moreover, that a cow not habitually drinking as much as 27 quarts of water a day—and he has met with such—is actually and necessarily a poor milker. She will give only from 5½ to 7 quarts per day ; but all cows seen by him which drink as much as 50 quarts of water daily were excellent milkers. In his opinion, the quantity of water consumed by a cow is a valuable test of her worth as a milk producer.

BUTTERFAT—THE MOST VALUABLE CONSTITUENT OF MILK.

The most valuable constituent of milk is butterfat, and the production of milk as rich as possible in fat is as

a rule, the chief aim of dairy-farmers. A number of experiments have accordingly, from time to time, been made with the view of ascertaining whether the fat of milk can be increased by any particular form of food, but the cow is such a 'changeable and complex milk machine' that definite results are difficult to obtain. The weight of evidence of my experience, however, goes to show that provided a cow receives sufficient of any nutritious and acceptable food the percentage of butterfat is materially increased by enriching the ration.

GOLD CUP WON.

It is here well worth mentioning that Copraline Cattle Feed was instrumental in Messrs. A. & J. Brown, 'Hedges Farm,' Hertfordshire, one of the pioneers in the British Frisian cattle world, winning the Earl Spencer Gold Cup, which is "The Blue Ribbon of the Dairy Herds Competition" being open to all cows in the United Kingdom, irrespective of breed, gaining the highest number of points in, inspection, milking trials, and butter tests. The cow in question being "Hedges Sweet Buttercup" which along with Messrs. A. & J. Brown's pedigree and prize-winning cattle, was from birth fed on Copraline

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JOTTINGS.

By Edgar Beckett, F.L.S.

Parrots As Pests.

The Agricultural Instructor for Berbice (Mr. E. M. Morgan), reports the fact that heavy losses have occurred to growers of fruit through the depredations of parrots.

He points out that within recent years these birds have become regular visitors to cultivated areas, causing considerable loss to farmers. During the recent drought, according to Mr. Morgan, they deserted the forests and appeared in certain cultivations in their thousands. They have wrought havoc in lime groves, and have destroyed crops of mangoes and oranges.

Instances are quoted where yields were reduced from 5 to 6,000 barrels of limes to less than 400, one farmer with 300 orange trees is reported to have lost every single fruit, whilst mangoes have suffered in a like manner.

These serious losses are said to be caused entirely by the depredation of these birds.

The writer has himself seen the enormous damage these birds can cause in a lime cultivation.

They are extremely difficult to deal with. No matter how one attempts to control these birds by pitiless shooting, flock after flock re-appears. They hide amongst the green foliage of the lime trees, dash off to another tree and are remarkably bold.

They do considerable damage in their flight through the lime shrubs by knocking off very young fruit and flowers.

They eat the lime seeds. It is not an uncommon sight to see thousands of lime fruit under a tree in all stages of growth, from quite small green fruit to full yellow fruit battered, and burst, where the parrots with their strong beaks have removed the seeds.

The damage done is very considerable. The loss to small farmers growing fruit such as Oranges and Mangoes in certain districts must be seen to be appreciated. Shooting is of little avail. Mr. E. M. Peterkin suggests poisoned bait in the shape of maize in trays about the fields. Some such method, with persistent shooting may control them. We may be lucky in not having parrots feeding on sheep's kidneys but it certainly is unfortunate that this screecher should be added to the list of the numerous enemies our farmers have to face.

The Typhoid Fly and Mosquitoes.

The common house fly should be known, locally, to our children as the Typhoid Fly.

Encouragement appears to be given to the breeding of this extremely dangerous pest.

If not actually proved, there is sufficient circumstancial evidence to connect this typhoid fly with such diseases

as cholera, dysentery and various parasitical worms. It may be taken as a fact that these flies come from the filthy places where they are breeding, straight into the house, and if not actually carrying disease germs, they are bound to be carrying filth. Perhaps, if this fact were rooted in the minds of all our people, a greater horror would be instilled into everyone, concerning this abominable fly.

It is astonishing how many persons seem to think nothing at all of allowing flies to swarm over their food, and many think nothing of drinkiug milk, or any other liquid, into which a fly has tumbled and perished.

As a routine, all school children should be made to look upon the typhoid fly as one of their greatest enemies.

If a snake, even if quite a harmless individual, be found in the school room, there is a "cry and a shout and a deuce of a rout" and every haste is made to despatch the reptile.

If a labba "tiger" were found in the school yard, the excitement would be intense, but, the danger is nothing at all, compared with the danger surrounding the typhoid fly.

Flies and Mosquitoes should not be regarded with equanimity.

They should be looked upon as the most dangerous of pests and everyone should do his or her best to get rid of them.

Mosquitoes in Georgetown, for the most part, may be considered as winged messengers of death, and, from childhood, every citizen should be taught to do everything possible to prevent attacks. Much can be done in the way of protection.

It is a matter for astonishment how few people seem to realise that protection from these two pests, is quite within the realms of practical politics.

The Drought.

There is one grain of comfort to be gathered in connection with the terrible drought we have recently experienced.

A long period of excessive rain, does more harm in the cumulative sense, than does a protracted period of drought.

The ground cannot be worked and though the damage may not be noticed at the time, the result of very heavy rainy seasons is most marked. On the other hand a period of drought often does good to the soil, and if worked, the soil aeration that is obtained results, when the rains do come, in better crops.

Though the sugar cane must have a considerable amount of moisture and requires in this colony a well distributed fall of from 80 to 100 inches a year, yet we can look forward, in the near future, to bumper crops.

In 1880 the date of the birth of the Botanic Gardens, Georgetown, the rainfall was 78 inches 17 parts.

In 1881	87·32
„ 1882	94·90
„ 1883	62·94
„ 1884	74·42
„ 1885	59·05
„ 1886	99·55

In 1886 the yield of canes per acre, after the drought of 1885, was excellent, and though a large area in Sugar-cane had been thrown out owing to the bad weather in 1885 and 1884, combined with low prices, yet there was a considerable increase in the exports of Sugar namely 124,283 Hhds. as against 106,731Hhds. in 1885, the money value in favour of 1886 being represented by £40,792.

With regards to crops other than Sugar, there was over-production in 1886. We may look forward to splendid crops after the drought, and if the scheme of having a Vegetable Depôt for farmers' crops is satisfactory, the question of over-production may not deprive the small farmer of the just reward of his labour.

MOTOR CULTIVATION.

The question of Motor Cultivation is deserving of thought.

With the Rototiller now working on more than one Sugar Estate in the Colony, we are looking forward to attention being turned to the cultivation of rice lands by mechanical means. The experiment is well worth the attention of some of our larger rice growers. If successful, it should not be difficult, through the aid of the Co-operative Loan Banks, for certain of our Villages to own, on co-operative lines, a machine, suitable for the preparation, cultivation, and harvesting of Rice.

GOATS.

Attention should be given by our farmers, to the question of keeping goats for milking purposes. Milch goats should play as important a part in this Colony, as milch cows. It is extremely unfortunate that goat breeding receives so little attention, that it is almost impossible, at present, to obtain a good milking Nanny.

Goats kept entirely for milk, would prove remunerative, and need not be allowed to become a nuisance and a menace to neighbouring gardens or vegetable plots.

SUNFLOWERS. (*Helianthus annuus*).

We would plead for the planting of Sunflowers on a large scale. The plant grows luxuriantly in this Colony, and the value of the oil produced from the seed, is of commercial importance.

Apart from this commercial view, the seeds are extremely valuable as a food for poultry—especially in wet weather.

With soil prepared by a Rototiller, huge areas could be put to sunflowers at very little cost, and an oil Industry of importance started as a subsidiary industry, which has a chance of becoming one of great importance to the Colony.

Both in Russia and India, this plant is grown for its oil seeds.

If the trees are topped, there is an increase in the yeild of seeds—1000 seeds should be produced by each plant. The percentage of oil in this climate could easily be ascertained, but it probably is about 15 to 16 per cent.

The oil is compared with ground-nut (***Arachis hypogœa***) oil, whilst in Russia, it is used chiefly in adulterating olive oil.

We already have a local soap-making industry, so that the fact that the oil is useful for this purpose, is not without interest. Purified, it is quite equal to olive oil. In colour it is a pale yellow.

The residual cake is excellent food for cattle. When one considers the amount of land available, the ease with which the plant grows here, with practically no cultivation, it will be seen that here may be an opportunity for some enterprising farmer to start this experiment.

The chances of establishing a Sunflower Oil Industry are very much better than the hope of exploiting our Kokerite palms (***Maximiliana regia***) for palm oil.

A few acres grown experimentally, would soon give the desired data as to cost of cultivation, percentage and cost of expression of the oil.

THE FLUOSILICATES AS INSECTICIDES.

By S. Marcovitch

Agricultural Experiment Station, Knoxville, Tenn.

The first extensive experiments with the fluosilicates as insecticides were carried out at Knoxville, Tenn., in the spring of 1924. Comparatively favourable results were obtained which were reported in Bulletin 131 of this station. The sodium salt was the only one available in commercial quantities, but it was not particularly adapted for dusting. Last summer one concern placed a "light" and "extra light" sodium fluosilicate on the market, and there has also appeared a commercial calcium fluosilicate. These chemicals were tried out in the field and much additional information was obtained. The results are not entirely conclusive, however, because the hot, dry summer kept the bean beetles from multiplying.

Sodium Fluosilicate—Extra "Light"

The "extra light" consists of 70 to 75 per cent sodium fluosilicate. According to the distributors, the remainder is silica. It was found, however, to be alumina which was used as a colloid to make a bulkier precipitate. This material occupies about 60 cubic inches to the pound and represents a decided improvement as far as bulk is concerned. The individual particles vary in size from 5 to 30 microns. A good grade of calcium arsenate occupies 80 cubic inches to the pound and the particles appear to be 2 to 4 microns in size. For many insects there appears to be sufficient fluorine in the "extra light" when used undiluted to secure a kill. For insects that feed sparingly, such as the boll weevil, the large amount of filler detracts seriously from the value of the material. It cannot be mixed with hydrated lime without seriously impairing its toxicity. When used undiluted the "extra light" is safer on foliage than the commercial sodium fluosilicate. On tobacco severe injury sometimes results.

Calcium Fluosilicate

The calcium fluosilicate was marketed as "calcium fluosilicate compound." This material is a by-product in *the volatilization method of treating phosphate rock for* phosphoric acid. It is insoluble and, therefore, safe on foliage, such as tobacco. It is light and fluffy, the particles being about 5 microns in size, and marketed in two forms, one occupying approximately 70 cubic inches to the pound and the other approximately 120 cubic inches to the pound. When used at the rate of 5 pounds per acre, the "compound" is not so toxic as the sodium fluosilicate. However, at the rate of 30 pounds to the acre, the control against the Mexican bean beeetle was good.

The manufacturers have discovered a method of increasing the fluorine content of the "compound" which should materially enhance its value as an insecticide.

Test With The Fluosilicates Against Certain Insects.

The "calcium fluosilicate compound" appears to be very effective against flea beetles, such as the new mint flea beetle in Michigan. In Arkansas, Baerg found that the blister beetles, heretofore not successfully controlled by arsenicals, are very susceptible to the fluosilicates. These beetles are especially injurious to soy beans where they are found in swarms. No *appreciable injury* was caused by the commercial sodium fluosilicate to soy bean foliage or alfalfa when diluted with an equal quantity of hydrated lime.

The control of the striped cucumber beetle has previously been far from perfect. It is a very difficult insect to poison with arsenicals because they act as repellents. Since the beetle has the habit of cleaning its feet by drawing them through its mouth, it would be expected to yield to the fluosilicates, and such was found to be the case. On June 12, several rows of cucumbers were dusted lightly with commercial sodium fluosilicate about seven o'clock in the morning. Eight hours later, it was difficult to find a live specimen, while dead beetles were numerous on the ground about the plants. As some foliage injury is pro-

duced when the commercial sodium fluosilicate is used undiluted, it would be advisable to mix it with 2 or 3 parts of hydrated lime. The "extra light" sodium fluosilicate also give good control and no burning when used undiluted. Cage tests showed that beetles succumbed to heavy applications of the calcium fluosilicate compound.

When the fluosilicates were mixed with bran in the proportion of 1 to 20, they were found effective in cage tests against grasshoppers and cutworms. There is some evidence that arsenic is somewhat repellent when used in cutworm baits, but this does not appear to be the case with the fluorine compounds.

Roaches were readily controlled with commercial sodium fluosilicate by sprinkling some of the powder in the corners of the pantry or on kitchen floors. In a few cases dead mice were found where the powder had been used. Sodium fluosilicate is also very useful against chicken lice when dusted in the feathers.

One great advantage of the fluosilicates over the arsenicals is their effectiveness against a variety of insects which cannot be controlled by arsenic. Furthermore, the fluosilicates appear fully as toxic as the arsenicals in quantitative tests against certain insects, whereas against man arsenic is far more poisonous. Sollman states that the fatal dose for the trioxide varies from 0.1 to 0.3 gram. Arsenic is also a nerve and capillary poison so that minute quantities are capable of destructive action. The fatal dose for sodium fluosilicate is not given, but for sodium fluoride is said to be 0.5 gram per kilogram of body weight. This means that arsenic trioxide is from 100 to 300 times as poisonous to higher animals as sodium fluoride.

Compatibility With Fungicides Or Insecticides

Calcium fluosilicate does not appear to react to any great extent with lime-sulfur or Bordeaux mixture. Sodium fluosilicate, however, precipitates sulfur out of the lime-sulfur and the two are, therefore, not compatible, especially for use on apples, A 3:3:50 Bordeaux with

sodium fluosilicate at the rate of 2 pounds to 50 gallons of water was not injurious to potato foliage and was toxic to the larvae of the potato beetle.

According to Kerr and Smith, sodium fluosilicate with either calcium arsenate or Paris green tends to liberate free, water-soluble arsenic (As_2O_5) with consequent injury to foliage. In one experiment 87.87 to 93.80 per cent of the total amount of As_2O_5 in the calcium arsenate was leached out of a combination of distilled water and a mixture of equal parts of calcium arsenate and sodium fluosilicate.

With lead arsenate only 1.5 per cent of the total amount of As_2O_5 was leached out, while Paris green gave 9.4 per cent. Sodium fluosilicate in a mixture of calcium arsenate or Paris green is, therefore, not safe to foliage. Calcium arsenate left in dust guns may also be responsible for foliage injury when the same gun is used for dusting with sodium fluosilicate.

Germicidal Value

In a paper presented before the American Phytopathological Society on December 31, 1925, H. W. Anderson discussed "The Control of Bacterial Spot of Peach with Sodium Silicofluoride." Bacterial spot (***Bacterium pruni***), considered the most serious disease of the peach in Illinois, is not controlled by the ordinary fungicides. Dr Anderson found that sodium silicofluoride in dilutions of 1 to 4000 to 1 to 4500 would always render broth sterile when inoculated with ***Bacterium pruni***. Sodium silicofluoride was found only moderately fungicidal inhibiting the germination of bitter rot spores (***Glomerella cingulata***) in dilutions of 1 to 800 when added directly to the spores suspension. Field tests showed practically no infection of bacterial spot, whereas those trees not sprayed with sodium silicofluoride showed 20 to 80 per cent of the leaves infected. ——***Industrial and Engineering Chemistry, Vol. 18, No. 6.***

THE PENETRATION OF FRUITS AND VEGETABLES BY BACTERIA AND OTHER PARTICULATE MATTER AND THE RESISTANCE OF BACTERIA, PROTOZOAN CYSTS AND HELMINTH OVA TO COMMON DISINFECTION METHODS.

(Amer. Journ Hyg.,—Vol. 5, p. 559).— ***A brief summary of the conclusions arrived at are that ;***

(1) Normally uninjured fruit vegetables do not contain living bacteria ;

(2) Finely divided matter such as carbon, protozoan cysts and ova do not penetrate the stem end of fresh vegetables to any extent ;

(3) Bacteria do not penetrate the unbroken skin of fruit and vegetables kept under market conditions ;

(4) Pathogenic bacteria may gain entrance through injured or decayed parts, but the spread is to a very limited extent. They have been found alive for from seven to 42 days ;

(5) Pathogenic bacteria may persist on the surface of fresh vegetables, if moist for 15 days ;

(6) Chlorination frees the surface of vegetable matter, but was not effective against cysts or ova ;

(7) Alcohol as a disinfecting agent was ineffective in killing protozoan cysts or ova ;

(8) Potassium permanganate in ordinary strengths was not effective against cysts or ova ;

(9) Burning alcohol on the surface or pouring boiling water over the surface does not allow of sufficient heat in the crevices to destroy all organisms ;

(10) Dipping fruits and vegetables into boiling water for ten seconds appears to be the only method which kills bacteria, protozoan cysts and eggs.

ANNUAL REPORT

OF THE

BRITISH GUIANA SUGAR PLANTERS' EXPERIMENT STATION.

1ST OCTOBER, 1924, to 30th SEPTEMBER, 1925.

STAFF.

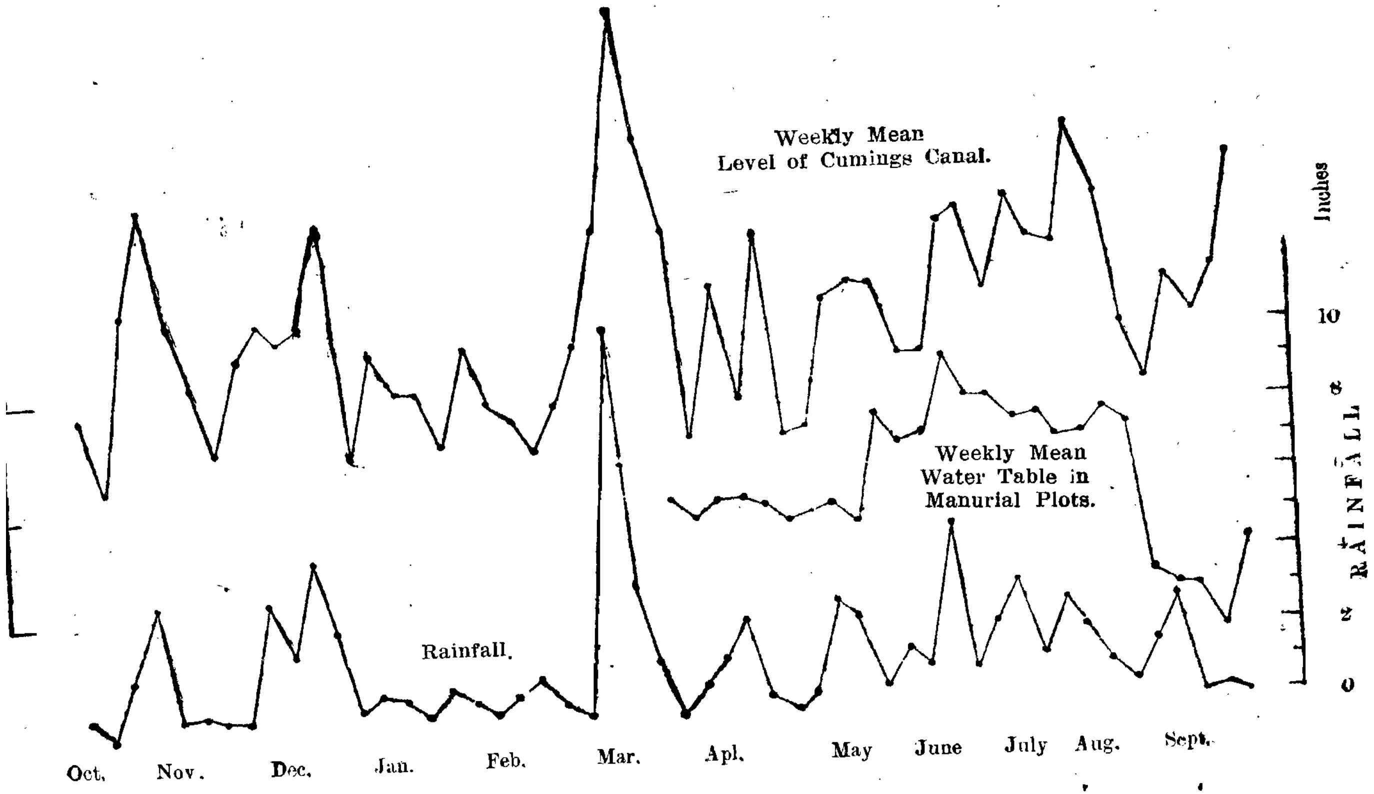
Chemist.—Mr. A. D. E. Lauchlan, B. A. of Saint Catharine's College, Cambridge arrived in the Colony on November 19th, 1924, and commenced work on the following day. Mr. Lauchlan took his degree in June 1923, and was engaged the following year in carrying out the analytical work in connection with the soil survey of the fruit districts of the Eastern Counties. This work was conducted at the School of Agriculture at Cambridge and was financed by the Ministry of Agriculture.

Field Manager. On account of the continued ill health of Mr. J. P. Bastiaans the Station has not had the undivided attention of one Manager for any length of time throughout the period under review.

Mr. Bastiaans was absent on sick leave from November 12th to the 28th, December 15th, 1924 to March 31st, 1925, and from May 12th to September 30th, giving a total of 263 days.

Mr. R. Thomson acted from January 13th, 1925, to March 31st, and from July 14th to July 31st, when he tendered his resignation on accepting an appointment in Goverment Service. There is no doubt that the Station benefited greatly as a result of the keen enthusiasm with which Mr. Thomson carried out his duties.

Mr. C. L. Johnson acted from August 28th till his services were dispensed with on September 15th.


Weekly Mean
Level of Cumings Canal.
Weekly Mean
Water Table in
Manurial Plots.
Rainfall.
Oct.
Nov.
Dec.
Jan.
Feb.
Mar.
Apl.
May
June
July
Aug.
Sept.
Inches
RAINFALL
10
8
2
0

Mr. J. E. Kidman was appointed on probation on September 15th.

It will be seen that for a period of 174 days the Station was without a Manager.

Field Overseer. Mr. C. Cameron has held this post throughout the period under review, and has proved of great assistance, particularly as he was able to carry on the work of the Station in the absence of a Field Manager.

Secretary. Mr. C. L. C. Bourne was absent on leave from April 3rd to September 29th. Mr. J. A. V. Bourne acted as Secretary during this period.

Laboratory Assistant. Mr. A. G. Mc Lean was absent on leave during the month of January 1925, and his resignation was accepted on the 31st. of that month. His resignation was brought about by his election to the British Guiana Scholarship.

Mr. E. S. A. Chin was appointed on probation on January 1st, 1925, and confirmed on the 1st February.

Clerical Assistant. Miss M. Sealy was appointed on October 20th, 1924.

WEATHER.

From an examination of the attached chart it will be seen that the greater part of the rainfall occurred in October and December 1924, in March 1925, and between the latter part of June and the middle of August.

The resulting fluctuations produced in the mean level of the Cumings Canal are clearly shown, the water level being injuriously high in October, December, March and August. The low level at the end of August neutralised the short period of high level at the end of September. Owing to the pumping plant being out of order the Station was entirely dependent on gravity drainage. A certain amount of relief was obtained by drainage through theNavigation Trench and the La Penitence Canal, but this was not sufficient to prevent serious damage to two fields of young plant cane in March.

In March 1925 a device for measuring the height of the water-table, i. e. the level of the permanent ground water was set up in the centre of the Manurial Plots at the Experimental Fields. This consisted of a small well about a foot in diameter and 6 feet deep. A loaded float was attached to one end of a light brass chain which passed over a pulley mounted on a suitable upright, the other end of the chain carrying a counterpoise. This load and counterpoise served to reduce the error caused by the weight of the chain itself. A pointer attached to the counterpoise gave the depth of the water level below the surface of the ground on a suitably graduated scale. Readings have been taken daily since the 1st. April 1925, and the weekly mean levels are shown in the diagram. It is regretted that readings are not available for the wet period in March when the water rose to within 9 inches of the surface.

The waterlogged condition of the field is probably largely responsible for the very small differences found in the Manurial Experiments. Sir John Harrison, who was also of this opinion, attributed the insignificance of liming experiments to the same cause. With heavy clay soils of this type the presence of standing water at a depth of only 2 feet below the surface in the centre of the bed invariably results in the next stratum—a foot or more in thickness being in a waterlogged condition. This state of affairs can only be remedied by deeper drainage, though it is only fair to point out that the drains of the Manurial Plots are only 9—12 inches deep.

It would be of great interest, and possibly of great value if the Manurial Experiments carried out by Sir John Harrison could be repeated on well drained land.

LABORATORY.

A detailed account of the work carried out in the laboratory at the Experimental Fields will be found in the report of the Chemist, which is appended.

EXPERIMENTAL FIELDS.

MANURIAL PLOTS.

The general arrangement of the plots remains as described by Sir John Harrison in the West Indian Bulletin, Vol. 13, Page 95. The present investigation was planned to obtain information on the following points :—

Series I. (1) Does the addition of rice straw as a mulch have any appreciable affect on the yield of cane ?

(2) Is sulphate of ammonia definitely superior to nitrate of soda as a source of nitrogen ?

(3) At what rate should sulphate of ammonia be applied to give the most profitable results ?

(4) A comparison of D. 625, D. 145, D. 118.

Series II. (1) Does the addition of potash have any appreciable influence on the yield ?

(2) Does the addition of superphosphate have any appreciable influence on the yield ?

(3) Does the addition of potash and superphosphate together have any appreciable influence on the yield ?

In the second series all plots received the same quantity of sulphate of ammonia as a source of nitrogen.

(4) A comparison of Bourbon, B.H. 10 (12.) Ba. 6032, D.625, D.695 and D.689.

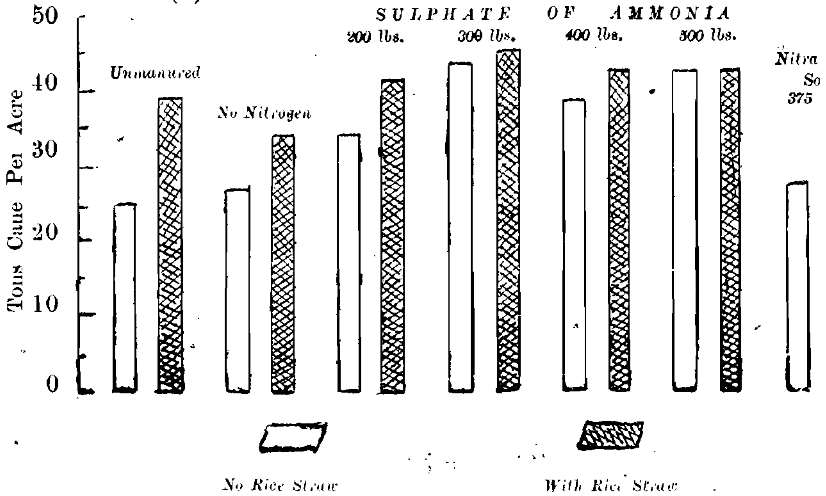
The plots were planted in June 1923, the manures were applied in December 1923 and the plots were reaped in November, 1924.

Series I.

(1) *The effect of rice straw as a mulch.*

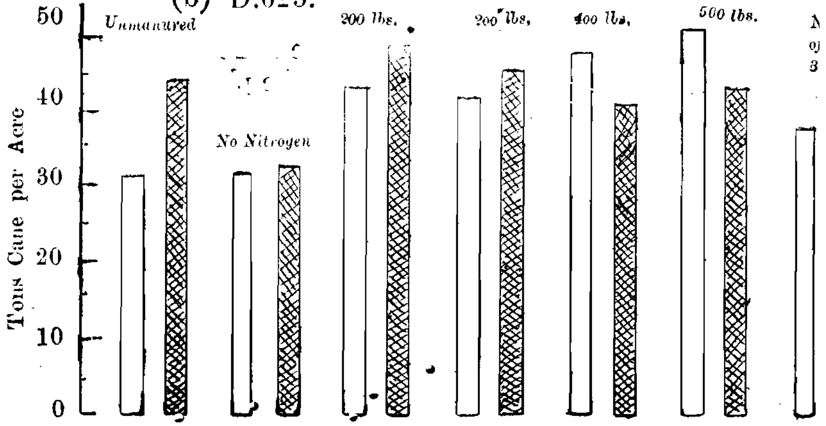
The three varieties employed in this series did not respond to the same extent, and accordingly it will be best to consider each separately.

(a) D.145.



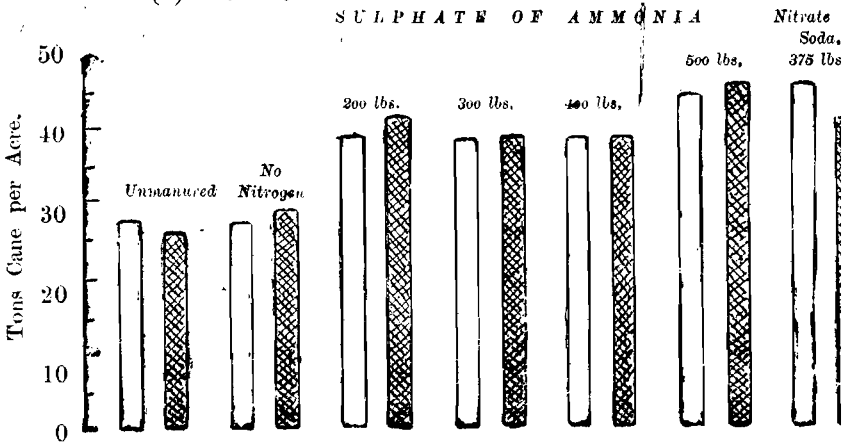
It will be seen from the above diagram that the largest gain is found in the unmanured plots, the plots receiving minerals alone not benefitting to such a marked extent. The additions of minerals would probably have an unfavourable influence on the soil tilth which would not be entirely counterbalanced by the effect of the straw. It is noteworthy that the yield without nitrogen and mulched is equal to that receiving 200 lbs. sulphate of ammonia and no rice straw. The maximum yield is given with the addition of 300 lbs. sulphate of ammonia, and here the mulching appears to have had very little influence.

(b) D.625.



the mulched plot gives as good returns as larger quantities of ammonia to the unmulched ones. It is surprising to find that with large additions of sulphate of ammonia, mulching apparently depresses the yield. This may be due in part to the exhaustion of the soil oxygen by the processes of fermentation of the rice straw, but probably to a greater extent to the loss of appreciable quantities of nitrogen by denitrification, a change which would readily take place in the compact non-aerated and heavy wet soils of this field in the presence of large supplies of organic matter.

(c) D.118.



Comparatively trifling effects are produced by mulching in the case of this variety, and the depressing action of minerals alone is not shown.

2. *Comparison of Sulphate of Ammonia with Nitrate of Soda.*

(a) D.145.

The plot receiving nitrate of soda alone gave practically no increase as compared with the minerals alone in

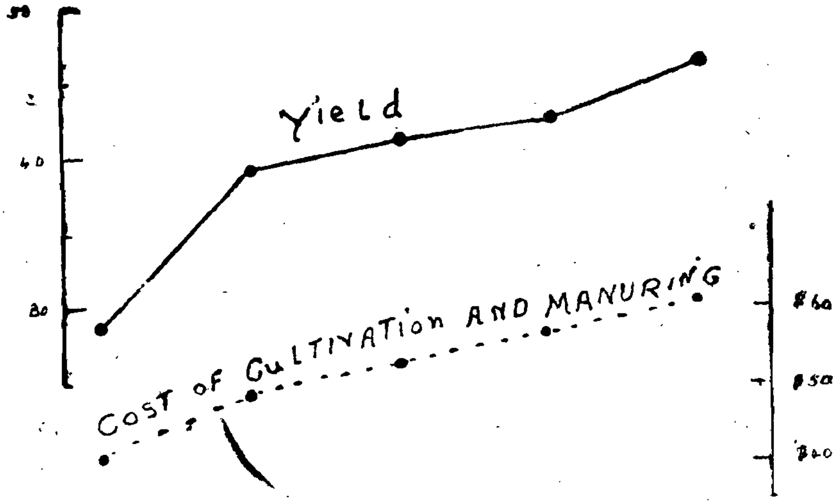
the unmulched, but mulching caused a considerable increase. Undoubtedly we have here a case of destruction in tilth as a result of deflocculation by the alkaline carbonates, the ill effects of which are greatly reduced by the rice straw.

(b) D.625

This shows a slight increase as compared with the no nitrogen plot, but the yield is less than that produced by the addition of small quantities of sulphate of ammonia. There is practically no difference between the mulched and the unmulched plots, the yield in both cases being roughly equal to that given by the mulched portion of the nitrate plot of D.145.

This variety appears to respond to nitrate of soda to the same extent as to a heavy dressing of sulphate of ammonia. This variety does not appear to be influenced by poor tilth.

3. ***The rate at which the sulphate of ammonia should be applied to give the most profitable returns.***



If we assume the cost of cultivation of the unmanured plots to be $40, and taking sulphate of ammonia at $88

per ton, we find that the gain effected with an application of 200 lbs. per acre is as great as that given with heavier applications. It is clear that of the three varieties under consideration D.625 makes the greatest response and this is undoubtedly one of the chief reasons for the success of this valuable seedling.

4. *Comparision of the three varieties, D.145, D.625 and D118.*

It is obvious from the above considerations that D.625 is superior to D.145 and D.118, and that D.145 responds more to improved tilth than D.118.

Series II.

(1) *Potash.*

In only one case was any benefit produced by the addition of potash and this was not confirmed in the parallel plot of the variety, namely Bourbon. This confirms previous experiments which have shown that the heavy soils of the coast land do not, as a rule, respond to the use of potash as fertiliser.

(2) *Superphosphate.*

With the exception of Bourbon all the varieties under trial made a small response to the addition of superphosphate. Of the Bourbon plots one plot showed a decided gain the other two parallels not responding.

(3) *Potash and Superphosphate.*

There appears to be very little advantage in giving a complete fertiliser with the possible exception of the two varieties Bourbon and perhaps Ba 6032 which apparently require rather larger quantities of potash than the other varieties.

Neglecting variety we find that the addition of potash produces a slight gain, that of superphosphate a rather larger one while the additional benefit obtained by supplying both potash and superphosphate is very small. It is

probable that on pegasse soils or on clay soils which are well drained and in good tilth these effects would be much more pronounced.

(4). *The Varieties.*

The order of merit would appear to be :—

(1) D.625 ... (4) Ba 6032

(2) B.H. 10 (12) (5) Bourbon.

(3) D.689 and D.695

OLD VARIETY PLOTS.

A number of varieties which were previously only in the arrow plots at Sophia have been planted in the Experimental Fields. This collection includes a number of importations from Brazil, some of which have already being tried as parents in the production of seedlings though so far without giving any of great promise.

1924 SEEDLINGS.

The sowing of arrows took place in November. The number of seedlings potted out into baskets by the end of February was 9,902 and the best of these were planted out early in May. These seedlings have undoubtedly suffered greatly from unfavourable weather conditions. The soil was saturated and waterlogged in the early stages and later they have suffered from drought. The wet condition prevailing at first resulted in the formation of a purely superficial root system and in consequence they were greatly handicapped at the commencement of the drought.

Table showing the parentage of the basket seedlings raised in 1924.

Parent	No of seedlings in baskets.	Parent	No of seedlings in baskets.
D.625	1950	Z. Cheribon	19
D.145	1544	Armstrong	12
Mani	1532	Bourbon	9
D.419	1529	D.436	6
D.118	1509	Caiara Roxa	6
Badilla	696	Leonardina	3
B.H. 10 (12)	421	Cayanna	3
Green Transparent	476	Maroue I.	2
D.4397	364	139 Java	1
White Transparent	20	Total	9,902

GREEN MANURES.

Sesbanea aculeata.

The first reference to this plant in this Colony appears to be in the report on the Agricultural Work in the Botanic Gardens for the years 1893-95, where Jenman and Harrison state as follows :—

"This leguminous plant grows as a weed on the dams and abandoned fields in the Colony. Its seeds, from their composition, are well suited for the food of birds and from their small size if fed to animals without crushing would probably be voided in an undigested state. The interest of this plant lies mainly in its adaptability as a leguminous cover crop for temporarily abandoned sugar cane fields.

It is mainly a seashore plant but spreads inland to abandoned fields and dams. When young and soft the foliage is eaten by grazing and browsing animals, but finally it becomes woody and dried up when it is useful only for kindling. The seed is plentifully shed and lies for several months on the ground, however wet the weather may be, till the period of the year arrives for its germination. The growth is very rapid. It is an annual."

The plant was grown on the green manure plots on the Brickdam Field and also at Sophia but does not appear to have aroused any enthusiasm.

It has been found in India that Sesbanea aculeata, known colloquially as "Dhaincha," is without exception the most valuable green manure plant. Although in general use in all branches of agriculture it has probably proved of the greatest benefit in the tea industry where green manures have now practically replaced Sulphate of Ammonia and Nitrate of Soda as sources of nitrogen.

In the past, the high cost of hand labour and the meagre labour supply of this Colony have proved insuperable obstacles to any proposal for green manuring on a large scale. With the present rapid spread of facilities for mechanical tillage it is probable that these obstacles will be removed in the near future. With the object of gradually providing a stock of seed in the Colony, all the available Sesbanea seed in the neighbourhood of the Station was collected, and amounted to approximately 1000 lbs. Small quantities were distributed to those estates which were in a position to grow it for seed purposes and the remainder was sown on the Station and on the Experimental fields. At the latter the plants sown in February 1925 were 4 feet high at the age of two months, and 14 feet at the age of 8 months.

Crotalaria striata.

Since Sesbanea aculeata suffers from the disadvantage of requiring a good seed bed for the production of a heavy crop the above species of Crotalaria has also been extended. Although its growth is not so rapid and it also forms more wood, Crotalaria will prove of value where difficulty is experienced in obtaining a good stand of Sesbanea. Experiments carried out by Mr. Arnold at Blairmont showed that Crotalaria gave a much heavier crop than did Sesbanea. Mr. Arnold attributed this to the impossibility of obtaining a friable seed-bed at a reasonable cost. Sufficient supplies of seed are not yet available to justify distribution to the estates.

Vigna repens.

In March 1925 Sir John Harrison drew my attention to a leguminous weed which had acquired an aquatic habit growing from the surface of the water at the old bathing pool near the entrance to Sophia. The importance of the discovery of an aquatic legume lies in its value as a green manure plant for flooded land. It was noticed that the plant was not flowering freely although making a vigorous vegetative growth. It was suspected that this was connected with the wet habitat, and accordingly the plant was extended in a drier situation. Since only a small quantity of seed was available this was sown in boxes and the seedlings transplanted as soon as they were large enough to be handled. Quincunx planting was adopted, the interval being 2 feet, and in spite of the wide spacing the plant spread rapidly and formed a dense carpet suppressing both grass and weeds. As anticipated, the plants blossomed freely and several pounds of seed have been collected which will be sown at the commencement of the next rainy season.

Professor C. V. Piper (Senior Agronomist U. S. Department of Agriculture) reported as follows to the Assistant Government Botanist with reference to this plant :—

"Your No. 100 is *Vigna repens*, a highly variable species which it may be possible to split up into a series of varieties. It is abundant in some places in this country and we have experimented with it as a crop, but in regions where it is not native the results have been indifferent. I see no reason why it should not be an excellent green manure crop particularly if the seeds can be gathered cheaply enough.

I am calling this *Vigna repens*, as there seems little doubt that the *repens luteola*, and one or two other names may represent the same species. Apart from the little experimenting we have done with the species I do not find any records of experimental work."

DRAINAGE.

In dealing with the weather conditions prevailing during the period under review reference was made to the water-logged condition of the manurial plots. The drainage water from the Experimental Fields flows down a trench on the Southern side of the Botanic Gardens and thence down the Croal Street trench. Owing to the Lamaha Canal and the Sophia navigation trench separating the Experimental Fields from the Station it is not possible to make use of the Sophia drainage system, without the installation of an aqueduct of which the cost would be prohibitive. There is no doubt that the trench in Croal Street is overtaxed in heavy weather and that the installation of a pumping plant to maintain the Croal Street trench at a reasonable level would be justified by the improved conditions that this would produce in a large residential area, apart from the great benefit which would be reaped by the Station. The installation of a small pumping plant at the Laboratory would greatly improve conditions at the Experimental Fields, but unfortunately this would probably cause the Croal Street trench to overflow in heavy weather.

SOPHIA.

SEEDLINGS.

1922.

A field selection was made by Mr. Bastiaans in October, and a second selection by Mr. Thomson in January. Samples of the selected canes were analysed. On cutting these fields for grinding an exceptionally stout cane was found which had been missed in both inspections. As the first three canes cut weighed 22, 20 and 19 lbs. respectively it would appear that complete reliance should not be placed on a system in which the first selection is dependent on field inspection. 157 varieties were extended in Field No. 5 W. As a result of the exceptionally heavy rains in March and the resultant long continued waterlogged condition of this field a large proportion of the plants died. In June the survivors were replanted in

No. 4 W. as stumps, so as to reduce the area under cultivation, and at the same time maintain a normal planting distance. This involved a loss of 29 seedlings.

1923.

254 of these were selected and planted out in Field 4 W. The exceptionally heavy weather in March resulted in a loss of nearly 60 per cent of these, 109 now remaining in cultivation.

1917, 1919, 1919, & 1920.

A number of these were extended from the last Section and planted in Fields 6-9 W. inclusive. This selection was conducted by Mr. Bastiaans and depended entirely on the appearance of the cane in the field.

It is to be regretted that more complete data was not available with regard to both the tonnage of cane per acre and the sugar content.

CHLOROTIC MOTTLING OF B. H. 10 (12) AND BA 6032.

Early in October the peculiar appearance of the abandoned plots of these two varieties in Field 12 W. was first noticed. The plants were extremely stunted and the leaves presented a suspiciously mottled appearance in addition to being extremely pale in colour. The plants were inspected by Messrs. Cleare and Altson who expressed the opinion that the canes were probably suffering from Mosaic Disease. The necessary steps were then taken to bring the matter to the notice of the managers of those estates which had received cuttings of those two varieties. In the majority of cases it was found that the two varieties had not given satisfaction where the planting material could be traced back to these particular plots. In a few cases growth had been so unsatisfactory that the varieties had been already thrown out of culivation as being of no value. Wherever healthy B. H. 10 (12) was found with a dark green foliage further enquiry

showed that the planting material had originally been obtained from some other importation.

From enquiries made as to the antecedents of the original importations in 1920 it would appear that these are open to grave suspicion. The exporters state :—

"These two lots however, did not come to us direct from the Plantation but through the Manager's Agent in town, a Mr. E. C. Hill. This Agent owns or leases a portion of what was many years ago known as Kensington Pln. on the Western outskirts of the town. Only a small portion of the lands is now under cultivation, the remainder being built over or in Tenantry. We know that Mr. Hill had some canes on these lands at the time because he spoke of them to us as being very vigorous and healthy, and it is just possible that some of his plants were included in those delivered from "Frazers" but he kept no record and does not remember whether this was so or not.

At the time of our shipment there was no suspicion of Mosaic Disease, the first appearance of which was reported to the Government by the Agricultural Department on the 27th October, 1920. In May 1922, however, Mr. Hill's fields were found to be infected and he was made by the Government to destroy four acres. He has planted no canes on the land since.

In view of the foregoing it is not impossible that so m plants from Hill's lands were included amongst those shipped and that the source of infection may be traced to them. Mr. Hill tells us however, that he sold a large quantity to St. Vincent from the same lands and that no complaint has reached him about these.

Mr. Altson in later reports expresses the opinion that the canes were not suffering from Mosaic Disease.

No matter whether the disease in question was actually Mosaic or some other form of chlorosis there is no doubt that this particular stock was not in a normal state of health and, consequently, that the precautions taken were justified.

DISTRIBUTION.

Apart from the few varieties distributed early in October on a selection carried out by Mr. Bastiaans, no seedlings have been distributed to the estates. It was

found that insufficient was known as the value of the seedlings under cultivation and later it was feared that indiscriminate distribution might result in the spread of the chlorotic mottling described above.

EXPERIMENTS IN UNDER-DRAINAGE.

The system of broad open drains which is universal on the estates probably presents one of the greatest obstacles to the use of mechanical implements for intertillage between the rows of canes. The open trench system has the further disadvantage that it excludes quite a considerable area from cultivation. In Upper Assam a system of covered drains has proved satisfactory and comparatively inexpensive, though labour there is very much cheaper than it is here. These drains were constructed as follow :—

(1) A trench was dug 1 foot wide and 2 feet deep.

(2) A trench 6 inches wide and 2 feet deep was dug at the bottom and in the centre of the first trench.

(3) A layer of bamboo matting was laid along the shoulders so made as to form a lid to the narrow trench.

(4) The sub-soil removed in digging the narrow trench was then placed on top of the matting and the first few inches well tamped by treading. The broad trench was then filled in completely.

It was found by experience that covered drains of this type still functioned after 10 years in heavy soils with a rainfall of 100 to 110 inches, of which the greater part fell between the middle of June and the end of September.

Three beds in Field No. 12 W. were drained in this way, but unfortunately the drains were not covered in as fast as they were constructed and this resulted in the shoulders which had been exposed to the weather cracking and subsiding to a certain extent. In spite of this and of the fact that the ungraded side line resulted in the bamboo matting being under water for the greater part of the year, this plot was obviously better drained than any other area

on the Station. Had the side line been graded, and the water level maintained at a lower level than that of the matting (which was only 18 inches below the level of the bed) still further benefits would have been obtained.

The cost of constructing drains of this type by hand is so great that the system cannot be adopted under ordinary estate conditions. The cost of excavation could be reduced considerably by performing this operation mechanically by such an implement as the Revolt Excavator. The following description of this implement is taken from the Journal of the Ministry of Agriculture, Vol. 26, P. 1082 (Feb. 1920)

> "The U-shaped share serves to scoop up a layer of the soil; the loosened soil enters the lower part of the inclined conveyor that carries it to the top of the machine where a discharge chute returns it to the ground on the side of the trench. An adjustable shoe in front regulates the depth of the cut. The conveyor is driven direct by the combined cog and carrying wheel that runs along the bottom of the ditch. It is understood that near Boston, Lincolnshire, working in light loamy soils the machine with a Fordson tractor cut 100 yds. 3 feet deep in half an hour.

The rate of working in a wet clay soil is not appreciably reduced. As only 6 inches can be taken at each cut, progress would be much more rapid with several machines in tandem though this would require a larger power unit such as the Holt tractor or the Fowler cable tackle. This excavator has already been tried successfully in this Colony but was found to be too light and flimsy.

In May 1925 I was informed by the South Lincolnshire Engineering Co., that they were starting construction on a new model which is to be heavier and more robust, and free from projecting bolts and studs which in the old model scored the wall of the trench and increased the friction unduly. This firm is working in co-operation with Messers. Marshall of Gainsborough and there appears to be every likelihood that they will produce a satisfactory implement.

It is quite likely that a cheaper substitute could be found for the bamboo matting used in Assam. Rough flat

tiles might be made from the heavy clay found on the front land, which could be burned in a stack kiln. It must be borne in mind that a narrow trench 2 feet deep is equivalent to a circular tile drain 18 inches in diameter. In the early experiments on tile drainage carried out at La Penitence, inadequately small tiles were used 3 inches to 4 inches in diameter, a size which is only used at the present time in England where the rainfall is one third of that experience here. The late K. J. Mackenzie of the Cambridge School of Agriculture was of the opinion that with a rainfall of 80 to 100 inches tiles at least 8 inches in diameter would be required.

Drains of the "cut and cover" type constructed in the forties in peat are still giving satisfactory service after 80 years. Here the cover was made from dried peat turves which were well rammed. A similar type of drain might prove satisfactory on pegasse soils.

DEMONSTRATION OF THE ROTOTILLER.

In April 1925 the first Rototiller to arrive in the Colony was kindly lent by Messrs. Davson & Co., to the Station for trial and demonstration. As the bearings had not been run in, the machine was stiff and did not develop its full power, but, in spite of this the machine developed a very good tilth, such as could only be obtained with any other implements on the heavy clay soil at Sophia by a long series of tillage operations which would have to be carried out under optimum weather conditions.

At the demonstration some of the planters feared that the machine would be too small and light for serious work on estates. A larger machine could not be used for intertillage in the cane field, and its lightness is really a great advantage since this facilitaties transportation from field to field. Experience has shown that with fair treatment (lubrication etc.) it will give continuous service, the quality of the work improving as the bearings get run in.

Reference must be made to the work carried out by Mr. Waterfield with the Rototiller at Pln. Marionville.

His experiments with one machine gave such promising results that three more machines were imported. No attempt was made to make covered drains, small wooden bridges being used to enable the machine to pass from bed to bed. In spite of the expense incurred in moving these bridges, the cost of cultivation was reduced to a very small fraction of that entailed by hand labour. The actual reduction of expenditure is comparatively of much less importance than the very great improvement produced in the quality of the work and consequently in the tilth. The saving in man power. that is the number of labourers employed per acre per annum, is an aspect of the problem which is of very great importance in this Colony with its very limited labour supply.

Apart from the improvement in the tilth produced by better cultivation, further benefits are to be looked for since this machine will render it possible to place large areas under leguminous cover crops such as Sesbanea and Crotalaria, and further to incoporate these with the soil. The Rototiller has successfully turned under crops of mustard standing 3 to 4 feet high.

I understand that a fleet of Rototillers have been ordered for Pln. Blairmont and I have no doubt that Mr. Waterfield will be pleased to answer any enquiries as to the capabilities and performances of these machines. Of course with the Rototiller as with any other implement the personal element must be taken into account, one man succeeding where another fails.

SPACING EXPERIMENT.

Upon the recommendation of Sir John Harrison three beds in Field No. 4 W. were planted out with D. 625 in the month of June at various interplant intervals. Sir John Harrison was of the opinion that an excessive number of tops per running rod were planted on the estates. Though this might reduce expenditure on supplies, it was laggely responsible for the poor spring which was probably due to the selection of plantin

material being insufficiently strict. Where a large quantity of planting material is required it is obvious that the same degree of discrimination cannot be applied in selecting the tops.

In this experiment the tops were planted at 36, 24, 18, 15, 12, 9 and 6 tops per row respectively, four rows for each spacing constituting a plot ; it was found possible to plant six series of plots, and since the produce from each individual row will be weighed separately, 24 observations of each spacing will be obtained.

"*THE JACKPAN.*"

A new implement called a "Jackpan" was received from Messrs. Booker Bros. for trial.

> "The Jackpan is not unlike a pick with a long handle and one blade which at the end broadens and flattens out into a chisel-like edge. The second blade is replaced by a wide, pear shaped disc. In use as a pan breaker or cultivator the Jackpan is driven into the ground like a pick. So great is its penetration, thanks to the scientific design, that only in the very hardest soil is more than one blow required to bury the blade. An upward pull on the handle causes the blade to rotate about the fulcrum formed by the disc, thus shattering the surrounding soil in a way that must be seen to be fully appreciated."

Unfortunately the labour in this Colony is not accustomed to handle the hoe so that the same degree of success was not obtained here with this implement as compared with the results obtained in the East. Nevertheless for one particular operation it was found to be of very great value, namely in opening up the soil after wet weather—"sub-soil drilling." This has been satisfactorily carried out at the rate of one cent per row per bed or $2.40 per acre, both banks being drilled.

The implement is substantially made and should have a long life. It is estimated that the cost would range from $1.08 to $1.20 each according to the quantity required.

GENERAL.

EXHIBIT AT THE ESSEQUEBO AGRICULTURAL SHOW.

The space allotted was situated on the North West corner of the show ground. The accommodation provided consisted of a large notice board 12 feet by 8 feet, a covered stall, and a small area of land enclosed by a fence for demonstrating a covered drain and a manure pit.

The notice board, which was covered with black cloth served for the display of a map of the Sophia Experimental Station on the scale of one inch to the rod, a set of four diagrams illustrating the construction and use of the Rototiller, and a collection of varnished canes.

On the back of the notice board were shown three diagrams giving :—

(1) The mean annual production of sugar in the Colony over periods of five years from 1826 to the present time.

(2) The areas occupied annually by the Bourbon and D. 625 varieties since 1902.

(3) The areas occupied annually by a number of seedlings and imported varieties since 1902.

Immediately in front of the notice board were found a number of young seedling canes in baskets and a box of still younger seedings. The latter served to illustrate the efficacy of the method devised by Sir John Harrison for raising seedling canes, the growth resembling that of a grass lawn.

On a table in the covered stall were arranged a number of experiments connected with soil problems. Prominent amongst these was a brass tube about four inches in diameter and slightly tapered. This, the Kopeczky soil sampling tube, is designed to enable a sample of the soil to be taken with the minimum disturbance. It has the lower edge sharpened to facilitate entry into the soil and is provided with lids which serve to close both ends tightly.

A gauze cover was also shown which could be interchanged with the lower cap.

An experiment in which use was made of these tubes was on view. Samples of soil, which had been taken with the minimum disturbance from under-drained and surface-drained plots, were shown to have widly different properties as regards the percolation of water. On pouring equal volumes of water on both samples the under-drained soil offered very little resistance to the penetration and passage of the water, while the surface-drained sample remained covered with water for a considerable period. The water dripped very slowly from the latter sample, but flowed rapidly from the under-drained one. This experiment was greatly appreciated as being a very satisfactory demonstration on the improvement of the soil brought about by under-drainage.

Another Kopeczky tube containing a mixture of ordinary clay soil and artificial farm yard manure shewed the great improvement in the texture of the soil produced by the addition of organic matter.

In the centre of the table there was a large stand supporting eight graduated glass tubes. Four of these dipped into a trough containing water, and the other four were suspended above the trough, the lower ends of the tube were closed with muslin covers. The tubes were filled with Fine Gravel, Coarse Sand, Fine Sand, and Clay, respectively. It was seen that the water rose to the greatest height in the tube containing Fine Sand, (owing to the small size of the capillaries.) The ascent of the water in the clay was so slight that it was barely visible. The downward movement was most rapid in the coarse grained soils, while in the clay the water only penetrated to the depth of an inch, though the experiment had been started the previous evening.

A young cane sett growing from a single node was shown to illustrate how it was possible to economise in planting material with the object of securing a more careful selection of tops.

In the enclosure a trench 18 inches wide by 18 inches deep had been dug. At the bottom of this trench, and in the centre, a second one had been cut 6 inches wide and 18 inches deep, on the shoulders so formed a bamboo mat was laid, and a portion covered in with soil. This illustrated the method of under-drainage successfully developed by Mr. John Pringle on the Pabbojan Tea Estate in Upper Assam, where it was found that drains prepared in this way continued to function for more than 10 years. A poster was displayed drawing attention to the advantage of under-drainage and giving a rough estimate of the probable cost of this method. Specimens of matting were also on view.

In a pit alongside was shown a sample af Artificial Farmyard Manure prepared from waste cane, trash and other vegetable debris. The material consisted of a soft friable porous mass scarcely showing any of the original structure of the cane, etc. The nitrogen content of the moist material was 0·31 *per cent*, which compares quite favourable with the ordinary Farmyard Manure or with that made by the Adco process. It is probable that the favourable type of fermentation is largely due to the presence of alkali in the subsoil waters.

Brief demonstrations were given at intervals throughout the day and appeared to create considerable interest, judging from the number of enquiries made, by cane farmers in particular.

LECTURES.

A lecture entitled "The Aims and Object of the Sophia Experiment Station," illustrated with lantern slides was given at the following centres :—

Diamond	Hampton Court
Leonora	Marionville
La Bonne Intention	Wales
Blairmont	Uitvlugt
Port Mourant	

A lecture entitled "The Plant Root and Its Environment" was given at the same centres with the substitution of Schoon Ord for Wales.

VISITS TO ESTATES.

Visits have been paid to estates at intervals but frequent changes in the managment of the Station have made it inadvisable for me to be away from the Station more than was absolutely necessary.

The most striking change during the last two years is the large increase in the number of outfits for mechanicial tillage. These are in the main designed for the periodicial deep ploughing before planting, the Killifer and the Rototiller being the two chief exceptions.

There is one direction in which estates equipped with pumping plants could effect a very great improvement in the soil conditions. As a result of the insistance on every possible economy being practised in view of the depressed condition of the sugar market, pumping plants are only worked to prevent the water in the sideline actually flooding the front fields. Consequently for long periods on end water may be seen standing up to within less than a foot of the beds. This inevitably results in the front fields remaining in a waterlogged condition and hence providing extremely unfavourable conditions for the growth of the cane.

If it were possible to maintain the water level at a reasonable depth, say three feet below the beds, by running pumps for longer periods it is extremely probable that the increased expenditure would be a profitable investment as a result of the increase in the yield of the cane and in the sugar content.

As a result of the improved conditions it would be found that the soil could be tilled more easily, that the canes themselves would have a larger and deeper root system and so be better equipped to withstand a period of drought.

OFFICE.

A card index of the seedlings at the Station has been compiled. On each card, information is given as to the location of the seedling, as to its cropping power and also its analysis. In compiling this index it was brought to

light that in a number of instances the same number had been applied to different seedlings. With the aid of the card index it will be possible to obviate the confusion which would have been brought about if this had not been discovered. A card index of scientific articles concerning the work carried out at the Station and at the Laboratory has been compiled and will be kept up to date from time to time. Typewriters have been purchased for the use of the Chemist and the Field Manager.

SALE OF CANES.

371 punt loads of cane were forwarded to Pln. Ogle. and these gave 89 tons of sugar. The Station received $4,050.78 as a result of the transaction.

	Acres	Punts	Approx. sugar per acre.
Sophia Station, Cultivated	47.57	293	1½ ton.
" " Abondoned	16.82	50	¾ "
" " Total	64.39	343	
Experimental Fields, Cultivated	3.33	25	2 ton.
Experimental Fields, Abandoned.	2.50	3	¼ "
" " Total	5.83	28	
Grand Total	70.22	371.	1¼ ton

COMMITTEE.

At the commencement of the period under review the personnel of the Committee was Sir John Harrison C.M.G. (Chairman) Hon. Mr. R. E. Brassington, Messrs. G. E. Anderson, A. E. Craig, R. Strang, P. H. Edwards and C. Farrar, the two last named being locum tenens for Messrs.

D. Clarke and W. M. B. Shields respectively. The Planters Association re-elected the retiring members Messrs. Strang, Clarke and Shields as from 1st January 1925.

Mr. R. P. Daggett acted for Mr. Anderson from April to the end of October, whilst Mr. W. S. Jones acted for Hon. Mr. Brassington from June to October.

At the September meeting it was decided to levy an assessment at the rate of 24 cents per acre during the forthcoming year.

A statement showing the total Receipts and Expenditure for the year ending 30th September, 1925 is appended.

C. L. WHITTLES,

Superintendent.

BRITISH GUIANA SUGAR PLANTERS

Statement Showing Total Receipts and Expenditure

RECEIPTS,

Balance 1923-24	$ 3,080.96
Assessments on Sugar Estates 1924-25	21,828.40
Government Contribution in lieu of assessments on Cane Farmers...	1,000.00
Interest on Savings Deposit ...	216.07
Sale of Produce	4,050.78
Other Sales	11.58
Refunds	[illegible]

EXPERIMENT STATIONS COMMITTEE.

for the Year ending 30th September, 1925.

PAYMENTS.

MANAGEMENT.		
Chairman	$1,000.00	
Secretary	580.00	
Superintendent (Salary)	3,380.64	
,, (House)	600.00	
Chemist	3,136.53	
Field Manager	2,599.03	
Chemical and Botanical Assistant ...	546.00	
Field Overseer	864.00	
Clerical Assistant	364.39	
Travelling	943.29	13,013.88
SOPHIA STATION.		
Wages.		
Buildings, Bridges, etc.	25.62	
Nursery	566.69	
General Cultivation	2,654.80	
Manuring	97.18	
Reaping, Transporting & Distribution	1,165.99	
Pests	507.66	
Canals and Paths	327.48	
Navigation and Drainage ...	123.48	
Irrigation	23.08	
Miscellaneous	853.01	6,345.39
Expenses.		
Rent and Insurance	1,134.50	
Buildings, Bridges, etc.	8.72	
Manures	171.33	
Reaping, Transporting & Distribution	202.44	
Navigation and Drainage... ...	12.78	
Irrigation	28.30	
Miscellaneous	124.72	
Office and Laboratory	2,128.63	
Contingencies	207.85	4,019.27
TOTAL PAYMENTS		23,378.54
Balance in Barclays Bank Savings Deposit		6,494.91
Balance in Barclays Bank Current Account		879.90
Petty Cash on hand, Field Manager...		25.00
Petty Cash on hand, Secretary ...		25.00
		$30,803.35

THE REPORT ON THE LABORATORY FOR THE YEAR ENDING 30TH SEPTEMBER, 1925.

STAFF.

The Staff of the laboratory, apart from the Chemist and his assistant, consists entirely of government apprentices. By the kind permission of the late Chairman it has been possible to employ these boys for all the routine work of the laboratory.

The number of apprentices employed at the laboratory depends on the nature of the work in hand, a large number being required when sugar analysis is being performed.

Much credit is due to them for having unfalteringly remained at work, which being of a routine nature, presents but few attractions. When it is considered that the work was quite new to them all, and not one of them had had any scientific training, it is gratifying to find keenness, interest and careful work so patent.

In only one case was a boy found to be unsuitable for the work. Below is appended a list of the names of the apprentices and the periods during which they worked at the laboratory. It will be noticed that one or two boys have only been employed for a few days, the reason being that these boys were required to fill vacancies caused by illness or some important business.

The boys are required to attend lessons, model gardens, and carpentry instruction, and these arrangements have also caused them to be absent for varying periods.

NAME	TOTAL DAYS.	NAME	TOTAL DAYS.
M. Lall.	193	J. B. Low	17
R. Hoppie	60	J. Pile	16
P. O. Jackson	58	J. Adams	5
H. Persaud	39	W. Jaundoo	2
W. Bovell	24		

EQUIPMENT.

BUILDINGS. Previous to March, 1925, the buildings of the laboratory only consisted of a mill room and a small room adjoining, which was reserved for the polarimeter and the writing up of the results. This room is also used by the Experimental Fields Overseer.

As the accommodation was quite inadequate for a reasonable amount of work to be done, the adjoining tool shed was incorporated with the laboratory by the removal of a partition.

This extra space being far removed from the engine was almost free from vibration, so that all weighing and preparation of solutions are now performed there.

A large number of shelves, which have been made from packing cases, have been fixed as there was no accommodation for bottles and other pieces of apparatus.

Two new benches were made and one removed from the mill room, being found more useful in the laboratory proper.

MACHINERY.

The original engine used for driving the mills was an experimental alcohol engine made by Messrs. Tangye. This engine was at least 25 years old and in such a worn out condition that a man was required to attend to it continually when running. Running periods appear to vary from ½ an hour to 4 hours, and this uncertain state of affairs appears to have existed for a long time judging from the stoppages recorded in the milling book. The engine finally broke down altogether in November and was pronounced by the government engineer to be quite incapable of doing any work.

An estimate for repairs was drawn up, but it appeared that the cost of such repairs was at least one third the cost of a new engine.

A new engine, a four stroke 10 h.p. oil engine by Messrs. Crossley, was therefore purchased and put down in March 1925 and has given the greatest satisfaction.

The engine is arranged to start on petrol and when warm to run on paraffin. This dual arrangement of fuel

allows of easy and quick starting : the starting time for the new engine being approximately 30 seconds as against half an hour for the old engine.

The mill, which was driven by the engine, was about 25 years old, but having done no serious work was in fair condition, the brasses were only slightly worn.

Owing to the small capacity of the mill, it was decided to purchase a second mill. The mill was installed as No. 2. mill and was driven from the same shafting. In the event of a break down of either mill it is possible to grind at least 50 per cent of the normal number of canes by one mill alone.

A supply of low voltage electricity was required for working various pieces of apparatus in the laboratory, and a 6 volt 60 watt generator and a 80 ampère hour battery was installed. This plant is identical with that supplied on motor cars for their lighting equipment. The dynamo is driven by a belt from the flywheel of the engine so that when the mills are running the dynamo will supply current at a negligible cost as the power required to drive it is very small.

A lathe, made by C. A. Vandervell and known as the Wade Lathe, was purchased with a complete set of tools, and has already justified its small cost by the amount of apparatus that has been made on it.

With this equipment the laboratory has very seldom to rely on outside help for making apparatus.

APPARATUS.

The only heating apparatus found in the laboratory was a small spirit lamp, which was quite useless for heating large vessels.

As power alcohol appeared to work well in the Barthel spirit bunsen burner and was cheap, it was decided to adopt this as the standard method of heating throughout the laboratory.

A small copper pipe was laid round the bench and the burners attached at T pieces as with gas.

The heat of the burner is good and steady, and the arrangement indicated above has nearly all the advantages of gas.

In order to keep the temperature of the laboratory as low as possible while soil work is in progress, a small corrugated iron shed was set up opposite the laboratory (this shed had originally been built by the late Superintendent at the back of the laboratory) and a battery of Barthel burner was set up there for the ignition of soil fractions.

A hot air oven and also a hot water oven together with a water bath have been installed there, so that there should be no danger of fire in the Laboratory when ovens etc. have to be left going overnight.

When the alterations were made to the building in March 1925, a high pressure water supply was arranged for use in connection with a filter pump.

This water supply consists of a 100 gallon tank supported on a wooden tower about 20 feet above the ground. Water is pumped into this tank from a 1000 gallon tank at the base of the tower.

Rain water collected from the roof of the building is stored in these tanks and supplied to the sinks by means of a pipe running the length of the building.

In order to keep the speed of the milling and the the sugar analysis constant, a special clock was made in the laboratory and set up above the mills. At a point near the door where the mill driver stands is an electric counter and alarm.

The clock is arranged to send an electric current to the alarm and counter every three minutes or any other desired period, so that a signal is given when another sample of canes is to be fed into the mill. As a further check, the electric counter shows the correct number of the sample which is supposed to go into the mill at the given signal.

The driver has complete control over his people, and thus relieves the chemist, of much of the detailed supervision of the milling.

This system has been found to work exceedingly well.

There was originally in the laboratory a small rough chemical balance which has been used for making up solutions of approximate accuracy, and for the weighment of soil fractions.

When a large number of samples have to be weighed this type of balance is unsuitable for heavy loads and also causes a great loss in time.

A semi-automatic balance was purchased from Messrs. Avery Ltd., which is suitable for weighing betwen 0 and 5 Kilos with an accuracy of ½ Gramme.

The balance consists of a set of unbalanced pans and the scale reads from 0—100 grammes. The object to be weighed is placed on the pan, and if less than 100 grammes indicates directly on the scale the weight, but if heavier than 100 grammes, a 100 or 200 gramme weight is placed on the opposite pan, so that the pointer then indicates the odd number of grammes.

Where a large number of similar weighments have to be made it is only necessary to record the difference shown on the scale.

It has been found that 144 samples can be weighed and the weights recorded by one person in less than 15 minutes.

The balance is of particular use when the moisture content of soils is to be determind as the sample has little time to change in weight while the weighment is being performed.

It has been necessary to order a certain amount of apparatus as the amount already in stock was found to be insufficient for the work in hand.

The Westphal balance in use was found to be inaccurate and it was fortunate that there was a spare available. The cause of the trouble is uncertain but it would appear that the knife edges are worn and require grinding.

An improvement has been effected in the use of the polarimeter. Formerly it was necessary to darken the whole room and to place an oil lamp on the opposite side of the partition separating the laboratory from the mill room. It will easily be understood how inconvienient this arrangement was.

A large packing case was treated with a dull black paint both inside and out, and the polarimeter was clamped firmly before a ground glass window in the end of the box. A small motor car bulb was mounted outside the box in front of the window and protected from damage by a tinned iron cover.

A second lamp was placed in the roof to illuminate the scale and also to afford light for the operator while pouring the juice into the instrument.

The lamps are controlled by a two-way switch so that either lamp can be used but not both at once; finally there is a black curtain nailed on the outside to keep out the light which would pass in round the shoulders of the operator.

It might be advantageous to install a small ventilating fan, though the time spent in the box is small as the readings can be taken with great rapidity owing to the improved illumination.

The determination of glucose has been arranged so that there is very little left to the judgement of the assistants.

The solutions are supplied from automatic burettes and pipettes so that it is almost impossible for too much or too little of the reagent to be used by mistake.

The heating of the glucose flasks is by spirit burners. As these burners give a very constant heat the error caused by variable times of boiling is minimised.

In order to allow of rapid weighing of the cane samples an iron cradle was hung up on the hook of a spring balance (the balance being corrected for the weight of the cradle). The mill driver has only to pick up the bundle place it on the cradle when the weight is indicated on the scale. The megasse is collected in small baskets and weighed on a spring balance; however here it is necessary to make an allowance for the weight of the basket, as a correcting factor could not be applied to the balance owing to the varying weight of the baskets.

The following account may perhaps give some idea of the system employed in the milling and analysis of the samples.

The samples which have been brought to the laboratory on the previous day are laid in numerical order, so that there shall be no loss of time in finding a missing sample. The mill driver weighs the sample of cane, recording the number and weight of the sample in a carbon duplicate book, unties the bundle and secures the wooden label to a zinc pan by means of a wire. At a given signal from the clock the canes are fed into No. 1 mill and the pan placed beneath the chute.

As soon as all the megasse has passed out of the rollers, the pan and the basket are removed to No. 2 mill where the process is repeated. In the meantime No. 1 mill has started on the next sample and the cycle of events is repeated.

A portion of the juice is filtered into a Winchester Quart and allowed to stand for an hour before sampling to allow all the bubbles to come to the surface. (The mills start an hour in advance of the analysts to avoid wasting an hour).

A second label is attached to the bottle bearing the same number for future identification as the wooden label is removed when the sample of liquor is taken out for analysis.

The sample passes first through the hands of the attendant who is determining the specific gravity, then to another who clarifies a small quantity for the determination of glucose and sucrose.

This latter sample passes first to the glucose determination where a small quantity of clarified juice is removed and the remainder is passed on the polarimeter.

Each worker has a carbon copy book, a page of which will take 20 entries. As all the attendants work at approximately the same speed, it is possible to collect the sheets from all the books as soon as 20 determinations have been completed, and thereby write up and check the analyses as the work progresses.

In the event of a sample being doubtful, a repeat can be performed as the bottle has still a label attached, but if the figures are found to be normal the sample can immediately be poured away.

By this method it is possible to finish all the clerical work the same day so that it can be decided what number of extensions can be allowed for whilst cane cutting is in progress.

The apparatus in connection with soil analysis may come under two headings :— Physical and Chemical.

In connection with the tilth experiments the Kopecky soil sampling tube requires a little explanation. It consists of a slightly tapered brass tube with the lower edge sharpened, and two tightly fitting lids. When it is required to immerse the tube in water for saturating the soil, the bottom lid is replaced by a tight fitting lid whose centre is replaced by a gauze. A set of 1 dozen of the tubes were purchased and have provided much valuable information. A detailed description of the technique will be found under the heading of Work Done.—***Soil Analysis.***

A small sampling augur (split tube pattern) was made locally and is used in the soil surveys. The method of using this augur is too well known for any further explanation.

The beaker method of mechanical analysis which is the official method has been adopted here and it was necessary to procure beakers and sieves 100 meshes to the inch early in the year as the laboratory was without them.

A dozen sieves were sent out from Cambridge, but later it was found possible to procure a good quality 100 mesh gauze locally, since then all sieves have been made in the laboratory.

A set of sedimentation vessels were ordered in connection with the Krauss method of soil analysis, the apparatus for which is in course of construction. When dealing with heavy clays it is not possible to obtain a complete dispersion by trituration alone, and it has been found that vibration of the soil suspension after trituration will effect this.

Accordingly some some small glass jars with celluloid caps were obtained in readiness for when the Krauss apparatus should be finished.

A supply of chemicals and small pieces of glass apparatus have been ordered for use both in connection with sugar analysis and soil work.

The p.H. apparatus, the parts of which were purchased by the late Superintendent, was found to be slightly out of order. It appears after overhauling that this apparatus will be quite satisfactory as soon as it is possible to obtain the necessary reagents for this class of work

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WORK DONE.

SUGAR ANALYSIS.

The first milling season of the year commenced on September 29th 1924 and terminated on February 25th, 1925. As has already been stated the old engine broke down finally in the middle of November, 1924 and all subsequent milling was performed on a small hand mill. It will be understood that this change caused a great loss of time as well as loss in accuracy due to the varying speed of milling on the hand mill.

During the season September to February 1915 samples of cane were analysed as compared with 359 for the whole of the previous year.

The interim period March to September was occupied in reorganising the laboratory in preparation for the next seasons grinding.

The September season commenced on the 15th, inst. and up to the end of the month 690 samples had been analysed. The report of the results of the September 1924 to February 1925 season will be found under the heading of Seedlings. The labour employed for the September 1924 to February 1925 seasons consisted of four men to turn the mill and one driver.

With two mills it has been found necessary to augment this staff and the total number of hands employed is now 7. The driver in addition of his duties of controlling the mill hands is required to weigh the samples of cane and megasse. As far as possible creole labour has been employed both in the case of driver and the mill hands.

Two creoles are required per mill to feed the canes and to receive the megasse, and one creole to fill the Winchester Quarts from the pans.

As the attendents have to give their undivided attention to the analysis a creole is kept to wash up the apparatus. Much of the lighter work is undertaken by girls and it is found that on the whole that they are industrious and quick in their work.

SOIL ANALYSIS.

It is very important to be able to determine the tilth of a soil, especially when heavy clays are present, but most methods that have been devised are either too complicated for use in the fields or too inaccurate where small difference of texture have to be measured.

An ingenious method of dealing with this problem has been suggested by Kopeczky who used a slightly tapered tube the lower end of which is sharpened to enable it to cut the soil easily. Owing to the taper of the tube the soil suffers but little distortion as the contact between the soil and the wall of the tube takes place only at the cutting edge.

The technique for determining the ratios between soil, air and water in soil is as follows :—

The tube is pressed into the soil, care being taken to keep it vertical, until hand pressure causes no further movement. A flat piece of board is then placed on the top of the tube and struck smartly with a mallet until the edge of the tube is level with the soil surface. The whole is then cut out *en bloc* with a spade and the surplus soil is sawn off from the bottom with a hack-saw blade to prevent

the puddling of the soil as is the case when a knife is used. The tubes are then capped and removed to the laboratory, where they are weighed as soon as possible. This weight consists of a mass of soil and water in a tube (the tubes being previously calibrated for weight and volume.) The bottom cap is now replaced by a gauze bottom and the whole immersed in water to the top of the tube for a period of 24 hours in order thoroughly to saturate the soil. At the expiration of 24 hours the tubes are removed and allowed to drain until the water just fails to run in an unbroken stream. The second weighment will then give the mass of soil completely saturated. The tubes are allowed to drain in a saturated atmosphere for 24 hours and then weighed to determine the moisture holding power of the soil. Finally the soil is dried out completely at 105 degs, C. and weighed again. A small quantity of the dried material is weighed out and ground in a mortar with a little water. After trituration the liquid is transferred to a basin and boiled to remove all entangled air, and when cool the whole is poured into a small density bottle and the true density determined. From weighments Nos. 1, 2, 4, together with the density and the known volume of the tube it is possible to calculate the percentage volume ratios of soil, water and air. This method has been used to determine the difference in tilth on land part of which has been forked and part Rototilled. The results of six parallel samples are given below :—

Forked land.			*Rototilled land.*		
Soil	Water	Air.	Soil	Water	Air.
44.3	25.6	30.1	35.1	18.3	46.6

Same samples after 24 hours saturation and 24 hours draining.

43.1	38.4	18.5	36.7	35.8	27.5

The above figures show well the improved drainage from Rototillage.

Several samples which have been taken on very wet land gave the proportion of air almost nil which was to be expected as the soil was almost perfectly compacted.

A subsoil sample from the back dam of Pln. Chateau Margot which was known to be poor had the following composition.

PERCENTAGES BY VOLUME.

Soil	Water	Air
51.2	47.0	1.8

It will be seen from these figures that the soil was highly compacted and in a bad state of cultivation.

In all cases at least six parallel samples were taken but it would appear advisable in future to take twelve, as the larger number gives a far more trustworthy result.

This method of tilth analysis can be of great value where different methods of cultivation are being attempted or where information is required as to the condition of the land for planting.

Early in the year the late Chairman suggested it, might be advisable to conduct a series of manurial experiments on a sand reef in order to compare the results with those of the Manurial Plots at the Experiment Fields which are on heavy clay. The situation of the sand reef was thought to be in the neighbourhood of field 16 W. on the Sophia Station. Accordingly a small survey was conducted on the whole of Field 16 W. and part of 17 W. The Field consists of 14 beds but it was found that the two beds at either end of the field was not of the same size and could not therefore be brought into concordance with the remainder of the field.

Each bed was divided into 7 plots of 1/30 of an acre and eight cores were taken from each plot. Half the number of cores were taken near the centre of the bed and the remainder towards the outside in order to reduce the sampling error due to curvature of the beds.

The samples were taken from two horizons, the first eight inches being the top soil and the second eight inches the sub-soil ; altogether 168 samples were analysed.

The method of analysis used was the official beaker method, the fractions being graded in Gravel, Coarse sand, Fine Sand, Coarse Silt + Fine Silt + Clay.

In no case was there found more than a fractional percentage of Coarse Sand, the residue after ignition being merely the siliceous remains of plant origin.

The mistake concerning the existence of a sand reef is probably explained as follows. When the sideline and the navigation trenches were being dug, Fine Sand together with Coarse Silt were encountered at about four feet and were thrown up on top of the beds with the rest of the material, thereby giving the soil the appearance of being sandy.

As the soil did not differ materially from that of the present Manurial Plots, it was decided not to carry out the scheme.

Some soil samples were taken about the middle of the year at Pln. Chateau Margot for a detailed chemical examination. Unfortunately there was insufficient apparatus in stock to allow the work to be carried out rapidly, in consequence of which the examination has had to be postponed as the commencement of the grinding season was due.

This work will be continued as soon as possible after the milling is complete.

A. D. ELMSLY LAUCHLAN,
Chemist.

"BOYS' AND GIRLS' CLUBS."

The Editor :
The Journal of the Board of Agriculture.

SIR,

There is being evinced, as the result in a great measure of the improved drainage and irrigation schemes, a quickened interest in Agriculture among our farmers, which cannot but be beneficial to trade and be very heartening to whoever is appointed to the post of Director of Science and Agriculture, rendered vacant by the lamented death of Sir John B. Harrison, C.M.G. If the person so appointed is sympathetically inclined to the needs of the farmers and prepared to assist and encourage their efforts, we can, I think, confidently look forward to witnessing a big forward movement in so far as Agriculture is concerned.

The Colony is generally referred to as an Agricultural one, but truthfully it cannot be so called taking the meaning of agriculture in its broad sense as including live stock. Far too little attention is paid to the stock of the small farmers, and to the improvement of the stock of the Colony in general.

An examination of our list of imports will convince any unbiased party that there are many items appearing thereon, which should be supplied by our farmers, and a surplus left for export. I do not think the importance and value of the agricultural industry outside of sugar is fully realized.

Our imports of the following for the year 1925 speak for themselves :—

Beef Brls.	...	5,953	...	$ 132,952
Butter lbs.	...	530,945	...	192,163
Cheese lbs.	...	199,570	...	52,606
Cocoa lbs.	...	218,471	...	32,729
Cornmeal bags	...	2,811	...	18,648
Ginger lbs.	...	58,328	...	12,709
Hams or Bacon lbs.	...	173,850	...	61,942
Lard, cases	...	11,262	...	54,860

Milk Cond. cases : , ...	18,465	...	154,523
Oil, Cotton Seed glns.	31,167	...	37,448
Onions lbs. ...	1,450,683	...	64,297
Pork brls. ...	7,154	...	199.883
Vinegar pkgs. ...	1,662	...	3,961

The time I consider is now opportune for the establishment of what are termed " Boys' and Girls' Club " in America and Canada, " Young farmers' Clubs " in England, " Pig Clubs " in Scotland, as I understand so far they have only aspired to one class, as in Barbados there are only " Goat Clubs." I am of course open to correction and welcome it.

The inception of these clubs had their origin in America by the inauguration of " Corn Clubs," and it has been said that to these clubs America owes the expansion of its corn industry. So rapidly did these clubs find favour and increase that it was found necessary to form "Pig Clubs " in order to consume the over production from the " Corn Clubs " and these were followed by the " Poultry Clubs " for the same purpose.

Government quickly recognizing the part these clubs were playing among the youth of both sexes, and the benefit in the cause of agriculture took them under their control by giving the Agricultural Department their supervision.

It was not long before the Canadian government also perceived the value and importance of such clubs, but looking presumably to the fact that youth being the period when impressions are most likely to be receptive decided to work through their Education Department, assisted by the officers of the Agricultural Department.

The clubs in Manitoba—Canada embrace the following :—

Calf raising	Sewing
Pig do.	Canning
Poultry do.	Noxious Weeds
Grain Growing	Dairying
Home Gardens (vegetables)	Wood Working and
Cookery	Essay Writing

In Ontario, the Government, by means of promoting bacon hog clubs, is endeavouring to bring about a uniform brand of bacon in Ontario. Some 150 such clubs were established last year (1925) alone in Ontario, bringing the present total to 257.

Notable progress has also been made in poultry raising in Canada to which the laying contests held in every province in the Dominion have materially contributed.

With the advent of registration for poultry the standard was raised from 150 to 200 two-ounce eggs as a minimum for qualification, and the bird must also conform closely to certain standard characters laid down for the breed.

In Saskatchewan, Canada, exists a poultry pool with a hen population of more than 9,000,000. Since the initial steps for organization were taken a year ago 9,500 poultry owners have signed full or partial contracts with the pool, binding them in matters of poultry and poultry products, turkeys, ducks and geese, with the exception of breeding requirements. British markets and Eastern Canada will absorb a large proportion of the output.

The establishment of these clubs in the village centres, and on the sugar estates of the colony should go a long way in solving the back to the land problem. Competition will be aroused by the holding of frequent shows as also interest and excitement.

It has been truly said by a writer "No Country can exist without a labouring class, and a nation of shop-keepers, petty traders, and hucksters to the exclusion of the tiller of the soil, would be a phenomenon in political economy."

Hon. A. B. Brown in his very interesting address given at the business session of the British Guiana Congregational Union at Providence Church on Wednesday 19th May, duly reported in the press, has furnished the Govern-

ment with food for thought, and he did not neglect to point out where they have been negligent as regards their educational policy. It is an address that deserves to be very carefully perused and digested by those having the true welfare of the colony at heart.

I am,

Sir,

Yours etc.

J. A. BARCLAY,

72, Barrack Street,
Kingston,
22nd June, 1926

EXPORTS OF AGRICULTURAL AND FOREST PRODUCTS.

Below will be found a list of the Agricultural and Forest Products of the Colony exported during the first six months of 1926.

The corresponding figures for the same period during previous years, and the average for the same period for eight years previous to that are added for convenience of comparison.

Product.	*Average 1916-23.*	*1924.*	*1925.*	*1926.*
Balata, cwts. ...	2,958	4,079	3,330	4,457
Cattle-food (Molascuit) tons	699	434	692	430
Cacao, cwts. ...	11	None	None	None
Cattle, head ...	220	199	357	11
Charcoal, bags ...	23,418	22,087	16,887	16,344
Citrate of Lime, cwts.	100	None	None	None
Coconuts, thousands	1,342	982	603	422
Coconut Oil, gals. ...	12,266	12,192	14,209	12,550
Copra, cwts. ...	1,001	11,798	7,670	28,478
Coffee, cwts. ...	3,196	4,475	3,681	6,445
Essential Oil of Limes gals. ...	92	None	81	153
Firewood, Wallaba, etc., tons	4,151	3,625	3,476	4,470
Gums, lbs. ...	1,717	None	None	866
Hides, No. ...	2,439	5,254	5,342	3,976
Kola-nuts, cwts. ...	2	None	None	None
Lime Juice, gals. ...	3,628	3,226	2,479	2,511
Lumber, ft. ...	88,096	75,644	44,288	116,988
Molasses, gallons ...	30,286	123,388	503,502	592,424
Pigs, No. ...	152	242	516	309
Railway sleepers, No.	6,233	9,000	23,515	5,184
Rice, tons ...	5,318	2,197	3,580	1,725
Ricemeal, tons ...	18	None	None	None
Rubber, cwts. ...	37	3	None	146
Rum, gallons ...	1,485,645	449,865	725,522	480,129
Sheep, head ...	27	17	6	None
Shingles, thousands	1,061	572	1,077	766
Sugar, tons ..	40,338	41,125	41,248	41,498
Timber, cub. ft. ...	64,766	80,533	134,535	136,272

Meteorological Data—April—June 1926.

Recording Stations & Months.	Rain-fall. Total Inches.	NUMBER OF DAYS OF RAIN: Under ·10 Inch	·10 to ·50 Inch	·50 to 1.00 Inch	1.00 Inch to 2.00 Inches	Above 2.00 Inches	Total days.	Evapo-ration. Inches	Air Temperature and Humidity. Air Temp. Maximum.	Minimum.	Mean	Humidity. Mean
Botanic Gardens.												
April ...	·48	2	1	...	...	...	3	7·69	87·7	77·2	82·4	68 9
May ...	12·94	...	9	3	4	1	17	4 83	86·6	76·9	81·7	76·3
June ...	20·82	3	8	3	5	3	22	3·65	85·4	76·3	80·8	81·9
Totals	34·24	5	18	6	9	4	42	16·17				
Means.	...	...	...	...	...	...	...	...	86·6	76·8	81·6	75.7
Berbice Gardens.												
April ...	1·40	3	1	...	1	...	5	...	88·0	75·0	81·5	69·5
May ...	13·15	5	11	2	3	2	23	...	87·3	75·3	81·3	78·9
June ...	15·26	6	14	2	3	1	26	...	87·3	74·8	81·0	79·6
Totals	39·81	14	26	4	7	3	54	...				
Means.	...	...	...	...	...	...	...	...	87·5	75·0	81·3	76·0
Onder-neeming.												
April ...	·44	...	1	...	...	...	1	...	89·0	74·0	81·5	...
May ...	9 36	1	6	5	2	1	15	...	88·0	73·0	80·5	...
June ...	16·42	2	6	4	6	1	19	...	87·0	73·0	80·0	...
Totals	26·22	3	13	9	8	2	35	...				...
Means.	...	...	...	...	...	...	...	...	88·0	73·3	80·7	...
Mora-hanna. N.W.D.												
April ...	·78	3	1	1	..	...	5	...	...	...	...	...
May ...	5.43	1	3	...	1	1	6	...	...	...	...	...
June ...	10·02	3	8	7	3	...	21	...	...	...	...	...
Totals ...	...	...	...	...	...	...	...	...	...	...	..	...

ATTENDANCES AT THE DISTRICT GARDENS

Year.	Bourda.	Belfield, E. Coast.	Stanleytown, New Amsterdam.	Suddie, Essequibo.	Den Amstel.	Houston, E. Bank.	Wakenaam.	Total Attendances.
1912 ...	5,514	4,395	3,302	2,100	2,544	2,156	1,718	21,729
1913 ...	5,156	4,535	2,519	3,399	2,568	1,836	1,319	21,332
1914 ...	4,243	3,869	2,443	3,025	1,791	1,653	1,533	18,577
1915 ...	1,123	1,006	769	59	503	339	401	4,209
1916 ...	4,705	1,161	1,510	225	623	2,251	1,297	12,026
1917 ...	4,991	2,820	1,366	3,297	1,186	2,564	1,663	17,086
1918 ...	4,834	3,081	1,653	2,671	2,162	2,790	2,067	19,258
1919 ...	4,769	2,425	1,582	2,798	1,851	2,480	1,556	17,461
1920 ...	6,285	2,312	1,665	2,525	2,532	3,228	2,148	20,695
1921 ...	5,671	1,968	1,642	2,629	1,949	2,539	1,610	18,008
1922 ...	3,557	1,841	1,105	1,593	1,525	1,522	1,397	12,950
1923 ...	4,038	2,780	1,595	1,934	1,953	2,137	1,951	16,388
1924 ...	4,123	2,827	1,103	1,789	1,678	2,146	1,664	15,330
1925	3,317	2,755	1,580	1,819	470	1,663	1,597	13,201

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